For the men who SPECIFY BUY and OPERATE
Refrigeration and Air Cooling Equipment

FEBRUARY
1960

Industrial Refrigeration

COVER—Machine room of Long Island orange juice packing plant, where as much as 1½ million gallons of juice are stored for packing. See page 10.

Another SPORLAN FAMOUS FIRST!

The LEVEL-MASTER CONTROL...1951

LMC
LEVEL MASTER CONTROL

A PATENTED LIQUID LEVEL CONTROL
for
ALL Flooded Systems
incorporating the
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on Standard Sporlan Thermostatic Expansion Valves
for Refrigerants 717, 12, and 22 with All These Features!

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PROVED THERMOSTATIC EXPANSION VALVE PERFORMANCE

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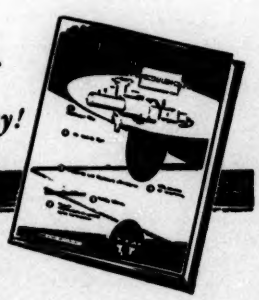

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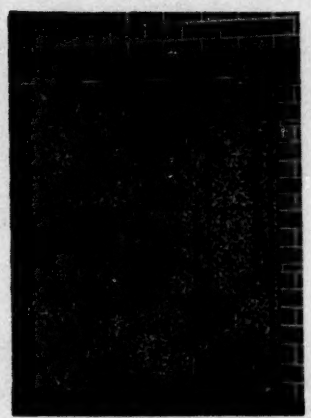
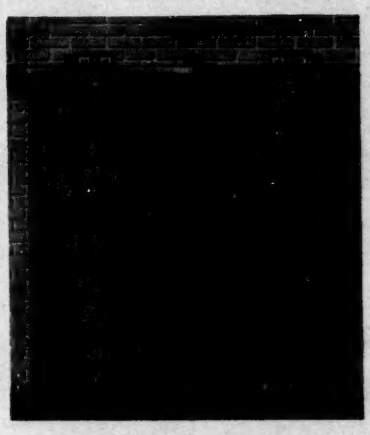
ALL TYPES



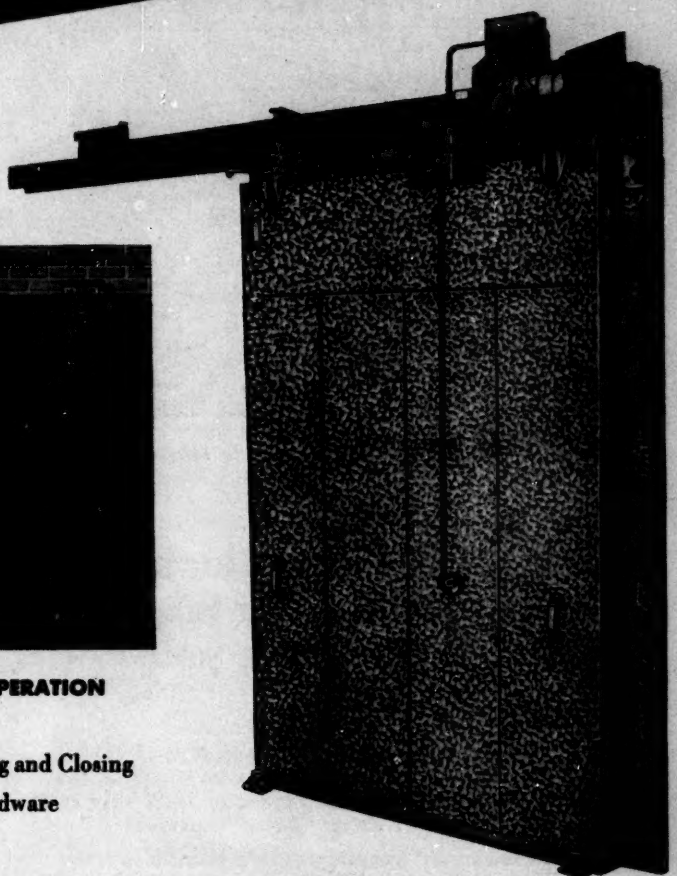
AIR OPERATION

- Safety Entrance and Exit Through Built-In Refrigerator Door
- Speedy Opening and Closing



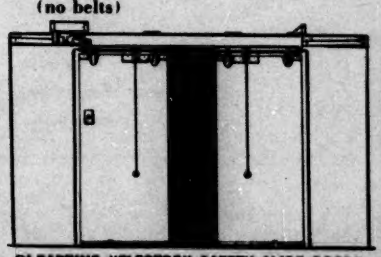
MANUAL OPERATION

- Dependable
- Easy Opening and Closing
- Durable Hardware



"Electro" SAFETY SLIDE

- Structural Simplicity
- Mechanically Sound
- Exclusive Automatic Sealing
- Gear Type Uni-Brake Motor Operation (no belts)



BI-PARTING "ELECTRO" SAFETY SLIDE DOORS

- Recommended where space factors dictate their use
- Gear Type Uni-Brake Motor Operation (no belts)

Write for descriptive bulletin . . .

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Heating Blankets and other Woven Heating Elements by SAFEWAY can make your COLD problems OLD problems!

Be it the frigid altitudes at which manned aircraft fly, the cold, trackless space domain of missile and satellite, or the icy arctic wastes of DEW Line installations — it's always "winter" somewhere.

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But SAFEWAY dispels such problems by packaging *controlled heat* for application *everywhere*. Among the wide variety of heating blankets and woven-wire heating elements which have been engineered by SAFEWAY to meet exacting specifications are:

- **heating elements for launching equipment and for airborne gyros, cameras, computers, servos and batteries — for missiles or aircraft**
- **de-icing units for airfoil surfaces**
- **heating elements for all types of ground support equipment**
- **defrosting units for industrial and commercial refrigeration**
- **heating blankets for honeycomb and metal-to-metal bonding**

For your copy of a fact-filled folder, please write:

If it has to be heated (and the "it" can be just about anything), you can rely on SAFEWAY engineers to study your problems carefully, and — without any obligation — submit an appropriate recommendation.

Safeway HEAT ELEMENTS INC.

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Industrial Refrigeration

February 1960

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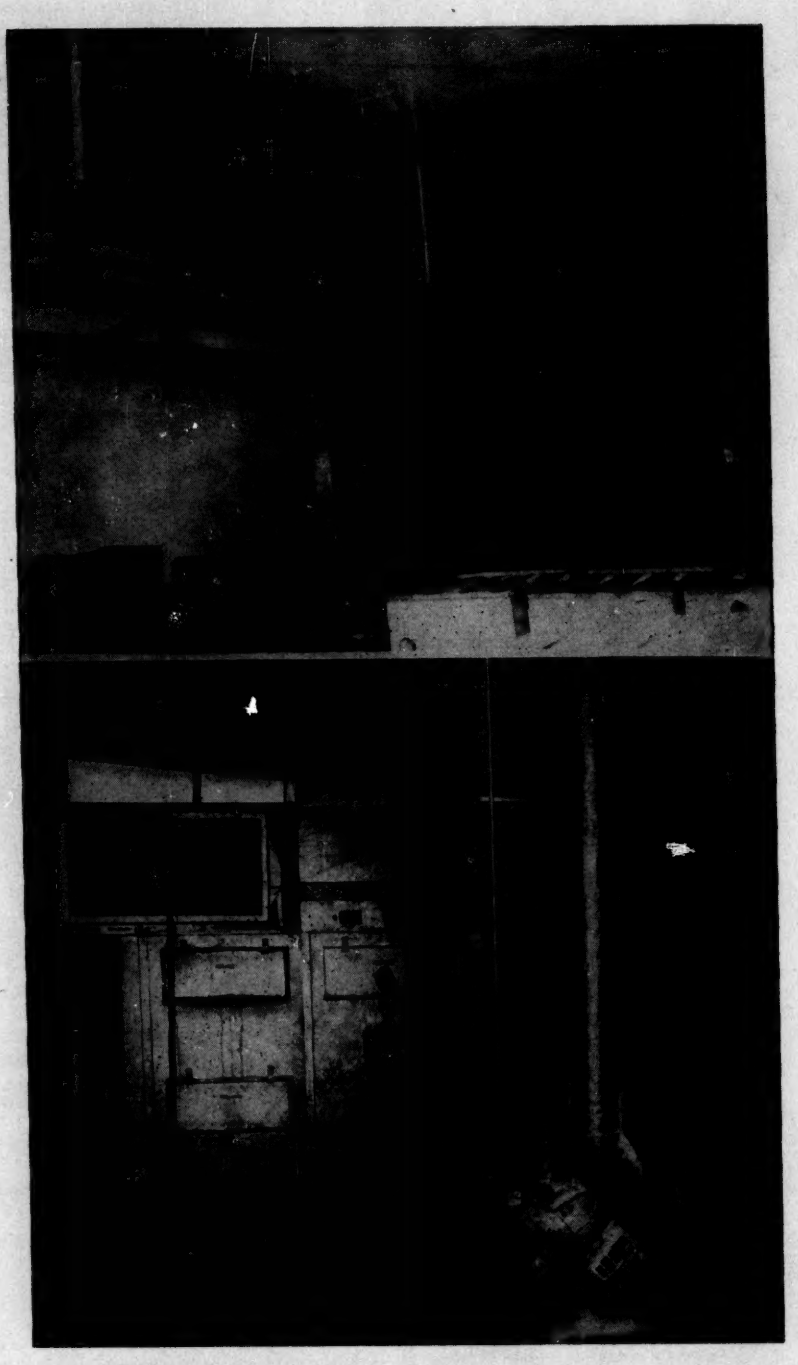
69 Years of Continuous Publication

Fruit Storage Needs High Humidity



»» PICTURED on this page is the equipment installed at the Cutler Growers Exchange in Cutler, California. The purpose of this refrigeration installation was to maintain proper storage conditions for peaches and nectarines. Designed holding temperatures specified was 38 degrees with a relative humidity of 85 to 90 percent. Through the use of this storage fruit is held until such time as the market is at advantageous level to sell. In the off-season for fruits, onions and tomatoes are stored in the same storage rooms.

The equipment furnished includes two Brunner 20 hp compressors equipped with capacity control. They are pictured in the lower photo on the right-hand side. A Drayer-Hanson PF-408 evaporative condenser is used to conserve water. It is pictured in the background in the lower photo. The Growers Exchange consists of two large storage rooms and it requires 12 Drayer-Hanson Flocold water defrost refrigeration coils with a capacity of 3600 Btu's each to handle each room. The system was divided into two separate systems each taking care of one room and each including 12 evaporators on a 20 hp compressor. In this manner each room can be operated independently of the other.

The system is a direct expansion type system with temperatures being controlled in each room by room thermostats, however, individual control switches were located near each blower coil so that it could be turned off thereby reducing the air moving capacity of the cooling coils within the space. This would be done when a room had reached the holding temperature and the fruit was being held for a long period of time. It being the intent that by so reducing the air in movement and the amount of coils in operation that a higher humidity would be maintained within a space and that by unloading the compressor a higher back pressure or coil temperature would also be maintained to keep from removing moisture from the product. By this means the temperature difference and humidity could be matched for the changes in product that might be placed in the rooms for storage.

The Engineer for installation was David E. Britton of Conditioned Air & Refrigeration Co., Fresno, Calif., who also handled the installation.

YORK Centrifugal Compressors Have Continuously Variable Capacity

—Follows product load curve automatically

PRE-ROTATION VANE CONTROL—Standard on all multi-stage Turbomasters, this infinitely variable control provides automatic, efficient capacity reduction. Refrigeration capacity is always in direct proportion to product load.

VERSATILE—Turbomasters are adaptable to brine cooling systems, large ammonia systems, and process water cooling systems from 75 tons refrigeration upwards. Units to meet your process requirements regardless of temperature level.

CLEAN, SIMPLE DESIGN—400 fewer parts than conventional models. Smooth rotor and impeller design—short, stiff shaft—flexible, non-wearing shaft coupling—integral centrifugal oil pump—all contribute to dependable operation.

MAINTENANCE REDUCED—Simplified centrifugal design cuts wear. Bearing replacement easily made without removing casing. One unit holds several operations at various temperatures. Well-suited to economical constant speed drive.

Another YORK Trail Blazer Concept Proved In Action at *John Morrell Co., Sioux Falls, S. D.*—York Turbomaster ammonia Compressor delivers 1,000 tons refrigeration at 5°F. Nine stage tandem unit has 1,720 hp turbine drive. Intercooler between casings and interstage injection provides efficient gas cooling.

YORK. BW

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Air Conditioning, Heating, Refrigeration and Ice-Making Equipment • Products for Home, Commercial and Industrial Applications

New Development Removes Odor Cleans and Humidifies Air

»» A NEW air conditioning development providing the first genuinely practical residential device for effective odor removal, winter humidification and constant-efficiency air cleansing was introduced recently by Carrier Corporation.

The product, a result of five years of research, was described by Russell Gray, vice president of Carrier and general manager of its unitary equipment division, as "the most important advance in air conditioning since the first central air conditioner for homes was produced."

Called the Carrier Automatic Air Purifier, it will make possible continuous 12-month control of the quality, humidity and purity of indoor air as well as its temperature. It will be marketed next spring for installation with new central air conditioning systems in homes and smaller commercial establishments or as an addition to existing systems.

"It will absorb all types of odors commonly encountered in the household, including those from smoking and cooking, and discharge them outdoors," Mr. Gray said. "Its effect is the same as 'airing out' the home completely with clean fresh air every 30 to 40 minutes.

"It is not only effective in removing new odors; it also will gradually eliminate the staleness caused by residual odors from tobacco smoke and other sources absorbed by walls and furnishings over the years."

As a wintertime humidifier, Mr. Gray said, the device will control the indoor moisture level automatically and precisely, regardless of outdoor weather changes. A new operating principle completely eliminates scale and clogging caused by minerals in water. Even the most expensive humidifiers have usually required frequent maintenance to rid them of mineral deposits.

The Automatic Air Purifier also provides continuous efficiency in air cleansing without the need of changing or cleaning the filtering element, according to Mr. Gray.

"Most filters, unless they are replaced or cleaned regularly, lose efficiency or interfere with the operation of the heating and cooling system as they load up with dirt," Mr. Gray declared. "The Automatic Air Purifier cleans itself every few seconds."

The device uses a filtering element consisting of many layers of aluminum mesh screen, which is bathed every 20 seconds by a wave of liquid passing from top to bottom. The liquid is water and a fluid called Carrex, developed by Carrier for its odor absorption qualities.

In laboratory testing, Carrier used a wide range of odor vapors representing sweet, sour, rotted and burnt classifications. A concentrate of tobacco smoke odor, described by the company as the most troublesome of smells, also was employed to prove the effectiveness of the Automatic Air Purifier.

The Carrex fluid, according to William McGrath, chief engineer of Carrier's Unitary Equipment Division contains a mixture of glycerine-like substances which picks up odors much as an uncovered piece of butter in a refrigerator will take on the smell of adjacent foods. It is nonflammable, non-toxic, non-irritating and has no odor of its own.

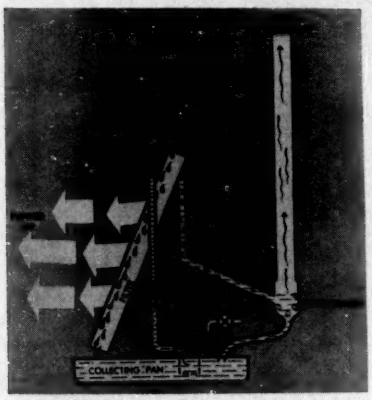
After absorbing odors passing through the filtering element, the fluid is heated and air is bubbled into it to carry away the odor vapors through an outside vent. Heating of the mixture also precipitates the water-borne minerals, preventing them from being deposited on the humidifying surface.

Humidity control is effected by regulating the proportion of water in the liquid mixture passing over the filter element. An instrument called a humidistat is set for the desired humidity level. It operates electrically, opening and closing a water valve to maintain rate of evaporation.

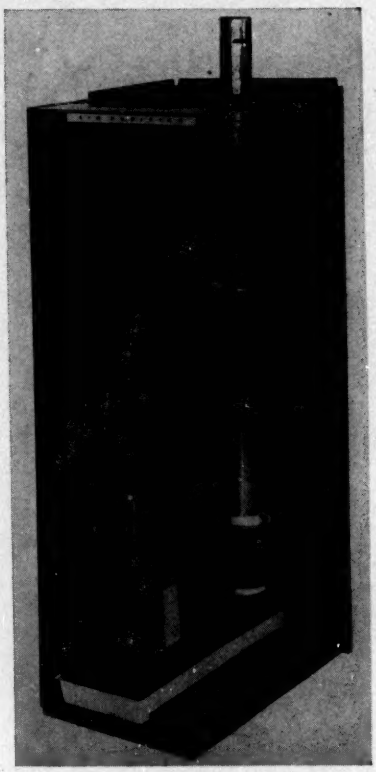
The successive waves of fluid over the filter element provide a flushing action which effectively removes all dirt collected and deposits it in a pan at the bottom of the device.

The Automatic Air Purifier when installed as part of a new central air conditioning system will cost about $250 in a home of average size.

Larger models for big building air conditioning systems will be ready for marketing next summer.

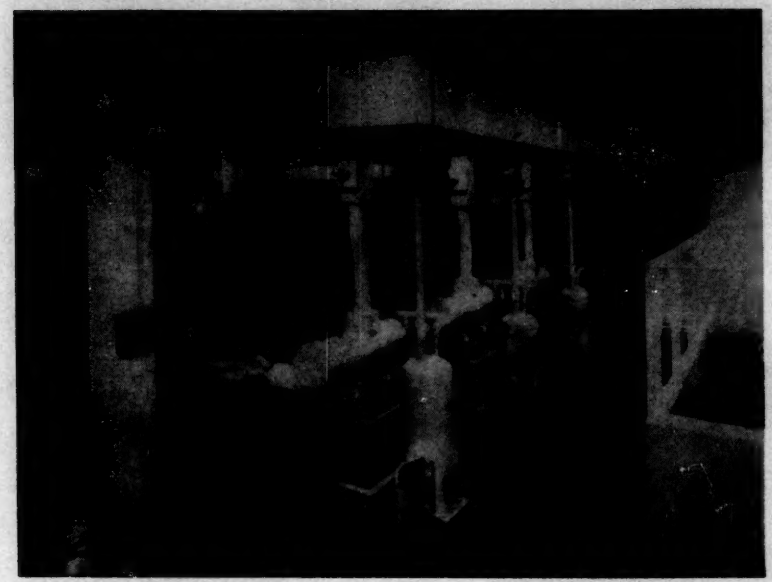


The large arrows show the direction of airflow through the filter element which is continually bathed with purifying fluid pumped from the collector pan at the bottom. Part of the fluid, consisting of water and a special odor-absorbing liquid called Carrex, is drained into the regenerator. Here, odors are removed and sent outdoors, and minerals which might otherwise clog the humidifying surface are precipitated. Humidity is controlled by a humidistat which adds the correct proportion of water to the Carrex.



A photograph of the development, with panels removed, shows the slanting filter element over which flows a solution of water and a special liquid called Carrex. The solution continuously washes the filter, absorbs odors and permits the release of water vapor to the air. At right is the regenerator where the solution is purged of odors which then pass to the outside via the ventpipe. The humidistat at bottom left controls humidity by governing the water content of the solution.

Brunner Units Rate Tops, "Down-Under"



»» IMPRESSIVE "Essington Lewis House", new headquarters for The Broken Hill Proprietary Co., Ltd. in Melbourne, Australia, is an example of the "world-wideness" of Brunner products.

Integral part of the "Essington Lewis" 11 story full air conditioning system, are three NR-100 Brunner compressors with 100 hp. squirrel cage motors. Location of the compressors on the first floor rear below ground level, demonstrates Brunner installation versatility. This location was necessitated by an adjacent 17' ground fall and bluestone foundations of adjoining buildings, precluding the possibility of a basement in the structure.

The three Brunner NR-100 compressors are connected to common 6" suction and 5" discharge lines with 25, 50, and 75% capacity control with liquid injection. Each compressor has an oil trap and is fitted with electric crankcase and oil trap heaters, thermostatically controlled. Refrigerant 12 is used.

According to E. C. Cameron, air conditioning manager, Gordon Bros. Pty. Ltd., Victoria, Australia, refrigeration and air conditioning engineers, the compressors "appear to be operating quite satisfactorily", thus insuring highly efficient air conditioning.

Brunner, a division of Dunham-Bush, Inc., West Hartford, Conn., USA, supplies air conditioning, refrigeration, heating and heat transfer products, as well as air compressors, throughout the world.

Large, Mall-Type Shopping Center Planned For Dallas

»» CONSTRUCTION of a $6,250,000 regional shopping center to serve north Dallas will begin June 1, 1960, with completion scheduled within 18 months following the starting date.

The center, to be called Bazaar Northwest, will be completely air-conditioned and constructed on a central mall. The center will encompass one-half million square feet of space under one roof.

Bazaar Northwest will be one of the largest air-conditioned mall-type centers in the nation, and will be the second to be built in Dallas, giving the Texas city the distinction of being the only one in the nation with two such centers.

Space for 35 tenants will be provided. Montgomery Ward has been announced as one major tenant, and negotiations are proceeding with others, including The Fair stores of Fort Worth.

Gerri Von Frellick, developer of Big Town, Dallas' other mall-type center, negotiated the Montgomery Ward lease for Bazaar Northwest. Majors and Majors, Dallas real estate firm, is handling leasing of stores and mall space.

All stores will open on the all-weather air-conditioned mall. There will be no exterior exposures for the stores. The mall will include two wide plazas and will be landscaped with fountains, sculpture and a bird aviary.

Externally, a stone facade across the truck service entrances will be converted into a waterfall, featuring lights and fire. Water will be provided from the center's air-conditioning system. The waterfall will also provide aeration for the air-conditioning.

The center will be built on a 39-acre tract overlooking Bachman Lake in northwest Dallas. A free parking area will accommodate 3,500 cars. Other features will include complete landscaping and a supervised children's playground.

Other establishments to be included among the 35 tenants will be a club, a restaurant and a food bazaar which will feature exotic foods from different nations throughout the world.

Henry C. Beck Company of Dallas is the general contractor. Architects are Welton Becket and Associates of Los Angeles, designers of Dallas' Southland Center and nationally-known designer of mall-type shopping centers and Jack Corgan and Associates of Dallas, designers of Dallas' Love Field terminal.

A regional center, Bazaar Northwest will serve an area of approximately 400,000 persons and will be more than three times the size of a neighborhood shopping center.

The concept of regional centers has evolved from detailed studies of population dispersal. Developers of shopping centers have found that the public prefers to shop in centers featuring both diversification and depth of merchandise.

The effect of adverse weather, definitely a contributing influence on business volume of shopping centers, has been overcome in Bazaar Northwest by using the covered, air-conditioned streets, or malls, between stores.

KRAMER

BETWEEN THE RAILS UNIT

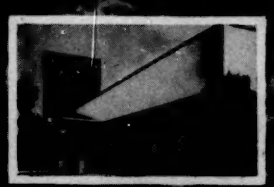


Photo - ROYAL CASTLE COMMISSARY, MIAMI, FLA.

KRAMER Presents a New Evaporator Principle

B-R unit combines all the advantages of the gravity coil with the advantages of the fan type unit. The result of years of research and development, it is the evaporator that answers the problem when the installation requires that "extra" in performance.

LOW AIR VELOCITY: Discharge velocities are no higher than a gravity coil—there are no air blasts. Ideal for installations where people must work in a refrigerated room.

NO DEAD AIR SPOTS: By distributing the B-R units over the ceiling area, even temperature and humidity conditions can be maintained throughout the area.

SPACE SAVER: Fits between the rails without hindering the movement of the stored product; it takes no usable space.

IDEAL FOR THE MEAT INDUSTRY: The B-R unit has proven very successful in the refrigeration of fresh meat. Shrinkage is cut to an absolute minimum, slime and mold are controlled, and the bloom and flavor is maintained. Ideal for carcass chilling, meat cutting rooms, meat storage rooms, aging rooms, smoked meat storage as well as pork, bacon and sausage rooms, etc.

MANY APPLICATIONS: Can be furnished with a hot gas heated pan for temperatures below 30°. Available as an "F" or "L" THERMOBANK system with or without the compressor for temperatures of 32° or lower. The B-R designs include units for Refrigerant 12, Refrigerant 22 and ammonia.

Write for Bulletin R-462

KRAMER TRENTON CO. • Trenton 5, N.J.

news briefs of the month

Ice Heaves Floor of Locker Plant

There is plenty of ice at Madison Frozen Foods, Inc., Madison, Virginia, but it is in the wrong place. The locker plant was forced to suspend food storage services and moved out the foods because a giant lump of ice had been formed beneath the storage room and was buckling the floor. Refrigeration coils in the ceiling of the storage room are supported by steel uprights and as the floor rises pressure of the uprights against ammonia coils may cause one to break.

The swiftly growing iceberg resulted from a break in the vapor seal. When that happens cold air combines with the warm outside air, condenses and freezes.

Houston's Bank To Have Biggest Cooling System

The new 31-story First City National Bank Building in Houston will own the largest air conditioning system serving a single structure in that city. A contract for air conditioning was awarded by Wallace-Straus Company, Houston mechanical contractor. All apparatus is to be at the job site early this year. The building contains 900,000 sq. ft. of floor space and is located in the heart of downtown Houston. Three large centrifugal water chilling machines driven by Elliott steam turbines will provide a total of 3600 tons of cooling capacity. Previous record for a commercial building in Houston was 3100 tons.

New Taxidermy Technique Employs Freeze Drying

Methods developed in freeze drying sections of human tissues for clinical medical research are being used by a biophysicist to preserve animals in a life like state. Harold T. Meryman, Ph.D. of the Naval Medical Research Institute, who developed the technique, explained that the method is simpler than taxidermy or wax impregnation. Advantage of freeze drying over conventional techniques lies in its preservation of fatty tissues, Meryman explained. Only the water in the animal's tissues is removed in this process.

Scores of museums throughout the nation have indicated interest in the method. None have employed it yet.

Explosion Was Not Caused By Ammonia—Court Decides

An article entitled "Blast Rocks Richmond" which appeared in the March 1958 issue of *Industrial Refrigeration*, page 34, told about an explosion in a cold storage plant in Richmond, Virginia, which almost leveled the structure. Original reports blamed leaking ammonia for the explosion, however, there was a hint that it could have been caused by leakage of city gas into the building from city mains. Court investigations since that time have tried to establish which was to blame.

On January 13, 1960 the U.S. Fourth Circuit Court of Appeals confirmed the judgment of the District Court in Richmond, Virginia that the explosion in the Merchants Ice and Storage Co. was caused by gas from the street gas mains and was not due to ammonia.

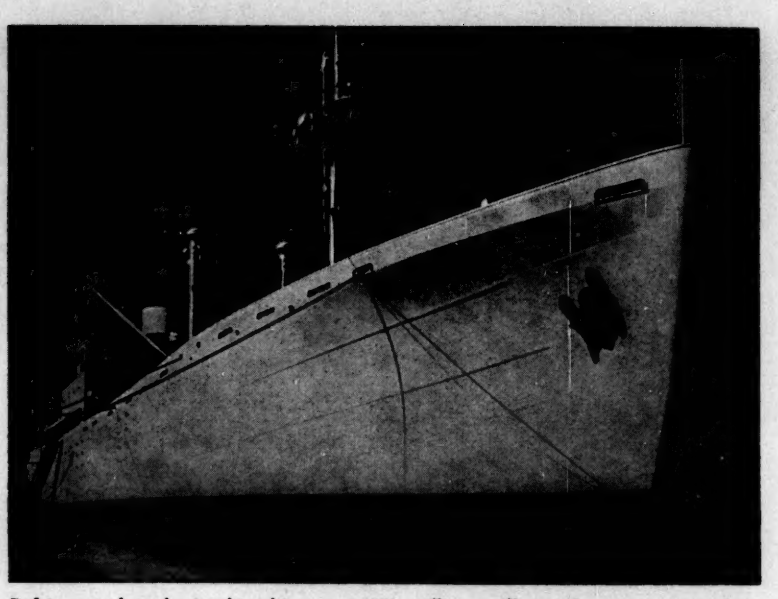
Precision Thermometry For Low Temperatures

The National Bureau of Standards is expanding its low-temperature research with aims of increasing the precision of temperature calibrations from 90 down to 20° K, and providing a calibration service from 20 down to 2° K. Steps will also be taken toward establishing fixed points and extending the International Temperature Scale below 90° K, where there is now no international agreement.

DuPont Grants Educational Aids for Scientists and Engineers

Grants totaling more than $1,300,000 have been awarded to 143 universities and colleges in the DuPont Company's annual program of aid to education, the company announced recently.

The largest part of the program is to help strengthen the education of scientists and engineers. Grants totaling $580,000 were awarded for the 1960-61 academic year to more than 100 colleges and universities to support the teaching of science and mathematics as well as other liberal arts subjects; for education and research in biochemistry in medical schools; and for postgraduate teaching awards and scholarships for prospective high school teachers of science and mathematics.



Refrigerated tanks in this ship carry 1½ million gallons of orange juice from Florida to New York every eight days.

By STEVE KOHL
and KARL KRAATZ

Refrigerated Rivers of Orange

»» HALF-WAY UP the sun-swept coast of eastern Florida lie two of the States' newest and most interesting attractions. The one, separated from the mainland by a narrow finger of ocean, is a scrawny v-shaped cape whose very existence was barely known three years ago. Then came the thundering missiles whose firings—and misfirings—startled the world and made Canaveral a household expression.

The other, looking seaward from the mainland to the Cape is Port Canaveral, home of famous Tropicana Products, Inc., the world's largest producer of chilled citrus and fruit juices.

The atmosphere surrounding Tropicana's Port Canaveral plant reflects the feverish activity prevalent in the whole Cape area. The highway leading into Port Canaveral is well planted on both sides with military buildings, many of which are located in fence-guarded restricted areas. Hustling soldiers in jeeps and army cars pass constantly, in and out, of the sentry-patrolled entrances.

Interspersed between the military installations are ultra modern structures housing the research laboratories of several world-famous aircraft plants. Fast walking workers, some entering, some leaving, pass through the glass doors, their serious faces in sharp contrast to the casual tropical shirts many of them wear. Even among the modest cottages of the married enlisted men and the more sumptuous homes of the officers, the dwellers move as if charged with a sense of urgency.

Turning off the main highway, a gravel road leads into the Tropicana plant. Here one is confronted with the same scene of activity. To the right is the restless blue-green of the Atlantic where at dockside, painters on scaffolds are busy touching up the 8000 tons of gleaming white that is the S. S. Tropicana. To the left are the sprawling buildings of the Tropicana plant. Everywhere in the air is the fragrance of citrus.

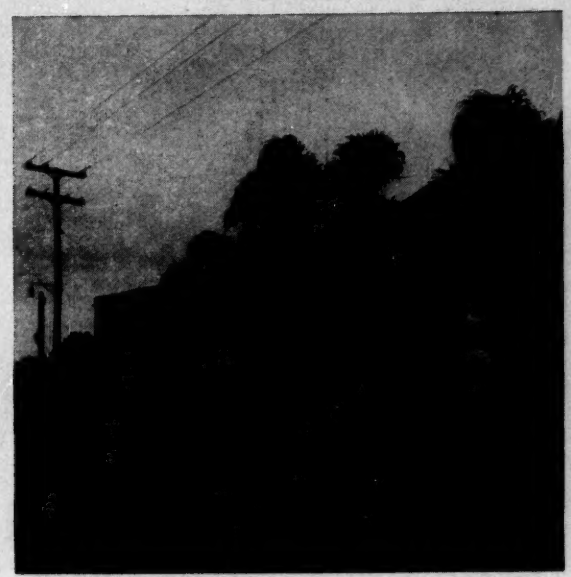
Tropicana Products, Inc., produces a wide variety of products, including 100 percent orange juice, chilled grapefruit juice, fresh 100 percent apple juice and fresh limeade in quart and six-ounce cartons. Other products are fresh fruits for salads, institutional and retail size; frozen citrus concentrates; orange oil and citrus pulp cattle feed manufactured from waste orange rind and pulp.

In addition to the operation at Port Canaveral, Tropicana has plants at Bradenton, Florida and Whitestone, Long Island, New York.

All Tropicana plants have voluntary USDA continuous inspection service. This means that Tropicana does not produce orange juice or grapefruit juice without USDA inspectors present, and these inspectors test the juice every 15 minutes. As an assurance of purity, the government then places its shield on every Tropicana carton.

Hand in hand with purity goes high quality which, in turn, requires strict quality control. To assure this, Tropicana maintains well equipped laboratories at all plants.

In New York the orange juice is kept under refrigeration until packaged for delivery.



Tropicana has own fleet of refrigerated trucks which deliver packaged juice to market.

Juice Flow North to Market

The company quality control director has received nationwide recognition in his field. Working under him as head of the research division is one of the few men holding a Ph.D in citrus organic chemistry. Naturally, all Tropicana quality control is closely co-ordinated with the USDA continuous inspection service.

The Port Canaveral plant is Florida's second largest citrus processing plant and is located in the heart of the Indian River section, famous for best quality citrus. Port Canaveral is also the home port for the S. S. Tropicana, which is the world's only industrial carrier of orange juice. Since 1957 it has averaged a round-trip every eight days from Port Canaveral to Whitestone, Long Island.

Transport operation is simple. The fresh squeezed juice, after processing, is pumped through stainless steel transfer lines into huge refrigerated tanks aboard the ship, which has an ultimate capacity of 1,500,000 gal. Fifty-six hours later the ship docks at Whitestone. Here its cargo of fresh orange juice is again pumped through stainless steel tubing into tremendous refrigerated stainless steel holding tanks ashore.

These tanks represent a brief way-station for the juice in its journey from ship to filling room. Flavor is preserved because the juice is not put into cartons until the day of delivery. The carton filling room is the largest in the chilled juice industry. Quart and six-ounce cartons are filled in tremendous volume and then delivered in Tropicana refrigerated trucks.

Refrigerating Equipment

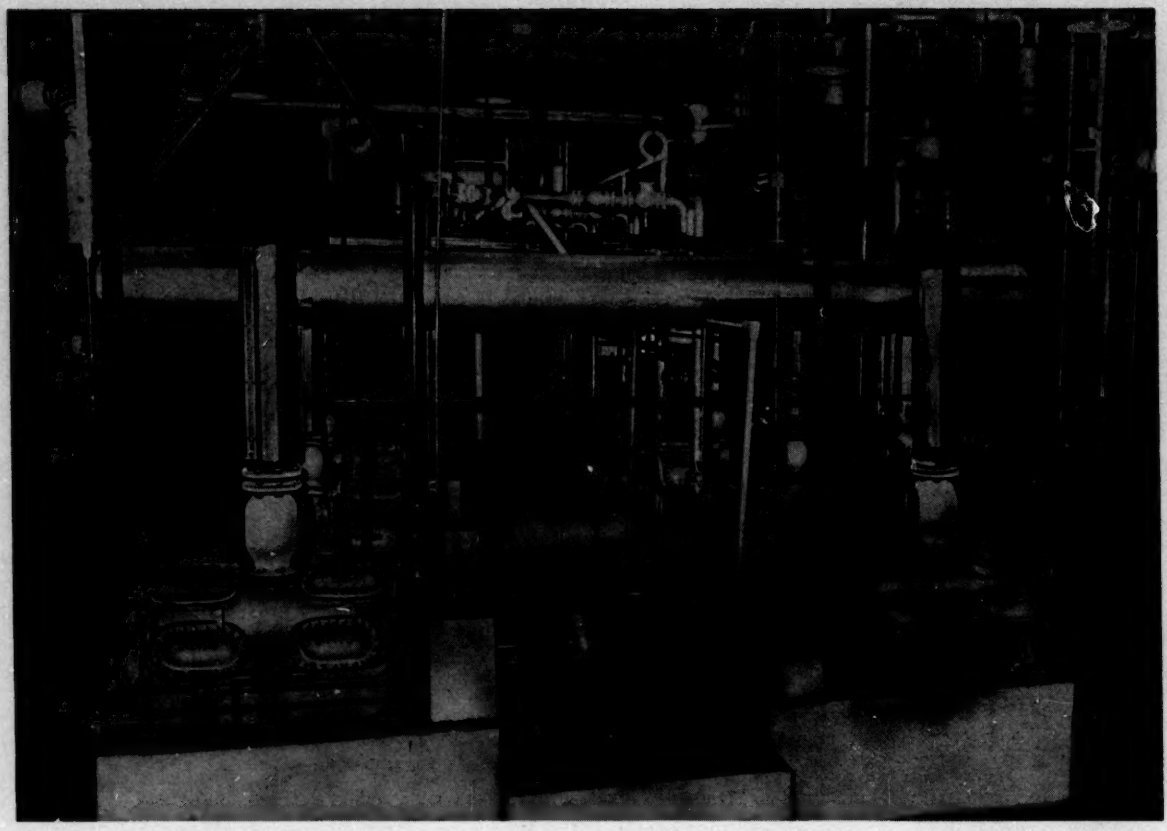
The Port Canaveral plant has a large ammonia refrigeration system of 1400 tons capacity. All of this refrigeration is used for cooling and processing fresh juices as there is no concentrate made there.

The plant's production can be broken down into three major areas: 1. Processing, Cooling and storing of juices for shipment. 2. Processing and freezing procedures involved in Tropicana's unique flash freezing method of storing pure single strength orange juice. 3. Production of citrus feed for cattle.

All the compressors are located in one large equipment building. There are sixteen Vilter compressors installed including two 16-cylinder VMCs and fourteen 8-cylinder VMCs, all arranged in duplex. These VMCs make up the plant's second stage while four competitive booster units make up the first stage.

The VMCs run at 880 rpm with 175 hp motors used for the duplexed eights and a 350 hp motor used for the duplexed 16's. All the VMCs operate at 30 psig suction and 185 psig discharge. The four V-belt driven boosters run at 630 rpm with a suction of 10-in. vacuum and a discharge of 30 psig. All compressors are set up for manual control. The Vilter intercoolers used are 42-in dia. x 7-ft high ammonia liquid and gas type.

Handling the discharge from the



Here is a general view of the engine room at Tropicana's Port Canaveral plant in Florida. In the room are 16 Vilter machines including two 16-cylinder VMCs and 14 8-cylinder VMCs all arranged in duplex.

compressors are six evaporative condensers and three horizontal shell and tube condensers. Pans on the evaporative condensers are flushed every sixty days. All condensers are purged automatically with Armstrong continuous purgers. City water at 76 F is used with the evaporative condensers while sea water varying between 50 and 85 F is used with the shell and tube condensers.

There are two receivers in the system. One is a 42-in dia. x 20-ft Vilter vessel, while the other is a 30-in x 20-ft unit.

Low Side Equipment

Evaporators making up the low side include: two 42-in dia. x 20-ft long Vilter ethylene glycol chillers, five Niagara Blower Co. No Frost air units, two air defrost air units, and three Mojonnier juice chillers.

Brine from the glycol chillers is used in conjunction with Tropicana's juice freezing process. Following the operation, the juice is transferred to their large cold room where the five No Frost air units hold the temperature at minus 25 F. When fully loaded, the cold room can hold 3,000,000 gal. Due to this storing method, Tropicana is able to supply flavor-fresh juice throughout the year instead of only during the citrus harvesting season.

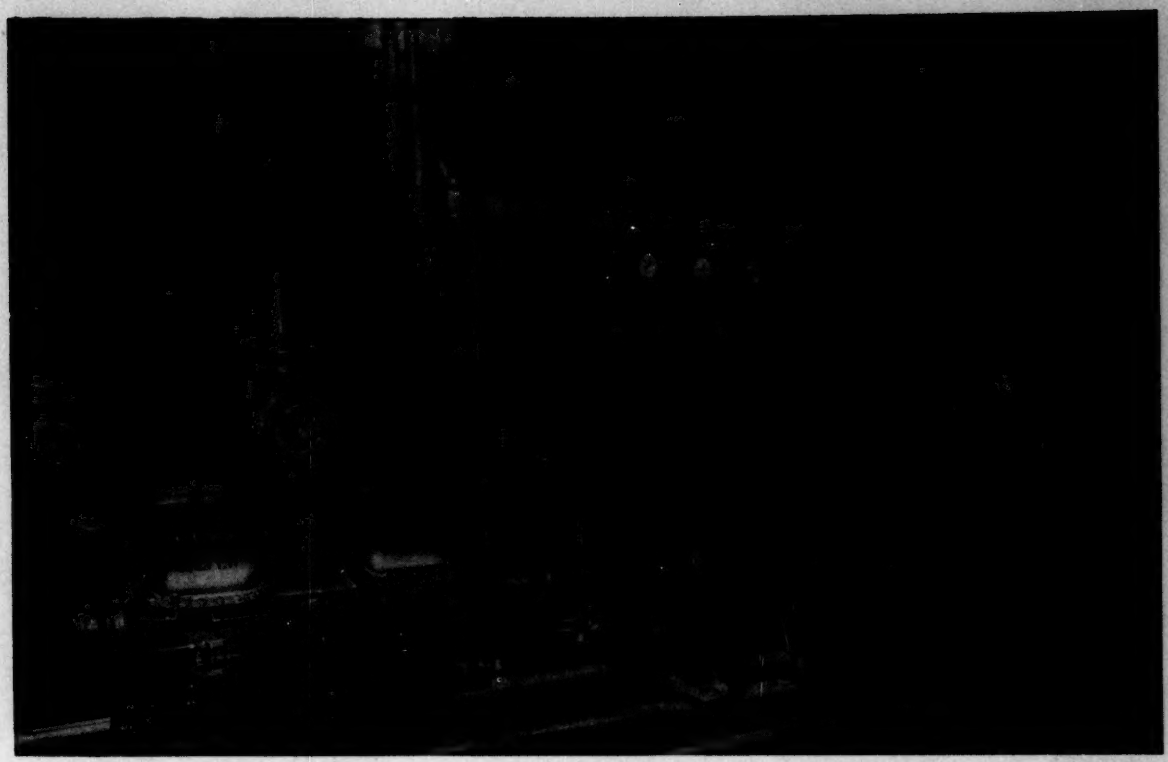
Ammonia Intercoolers

These three Vilter intercoolers located in the Port Canaveral Florida plant are 42 inches in diameter and 7 foot high. They are the ammonia liquid and gas type.

Large Tank Room

Juice which is to be used in the near future is first chilled by the three Mojonnier chillers and then stored in the tank room. This room is thermostatically controlled and is held at 26 F. by the two air defrost units. The tank room has a capacity of 280,000 gallons of juice.

Evaporators are full flooded by means of low-pressure floats. Only the Mojonnier chillers have pressure regulating valves. Neither in



Tropicana also has a plant in Bradenton, Florida. Included in the refrigerating equipment are two 12-cylinder VMC compressors arranged in duplex shown above.

the tank room nor cold room is it necessary to control the humidity. To handle any liquid return, there is a 42-in dia. x 10-ft suction accumulator in the compressor room. This unit operates with valve controlled, equalized pressure and returns the liquid to the receiver.

85,000 Gallons Per Day

The entire system functions smoothly and efficiently to handle Tropicana's large daily requirements. To give some idea of how large these requirements are these factors are to be considered: In an average 10-hour day run, Tropicana processes 15,000 boxes of oranges at Port Canaveral. Each box weighs 90 lbs. and contains 400 to 500 oranges. Each orange is individually juiced by automatic squeezers, and the rind and pulp is then conveyed away for use in cattle feed. From each box of oranges about 5.7 gal. of juice is extracted. A little simple arithmetic will show this plant alone can produce 85,500 gallons of juice per day—and that's a lot of sunshine vitamins in any man's language.

Tropicana's plant in Bradenton, Florida is similar to their Port Canaveral plant insofar as fresh citrus juices and citrus pulp cattle feed are produced. However, in addition to these, the Bradenton plant produces fresh fruits for salads, frozen juice concentrates and apple juice. In the case of the apple juice, this is the only apple juice processing facility in the state of Florida. Apples are transported from Virginia in Tropicana fruit trucks for processing and packaging in quart and six-ounce cartons.

Vilter equipment is also liberally represented in the ammonia refrigeration system at the Bradenton plant. Here is a list of the equipment installed.

Two 16-cylinder VMC compressors arranged in duplex. The compressors run at 870 rpm with a 300 hp motor, and operate at 25 psig suction and 185 psig discharge for a capacity of 226 tons.

One 16-cylinder VMC compressor direct-connected to a 200 hp motor runs at 870 rpm at 90 psig suction and 230 psig discharge for a capacity of 305 tons.

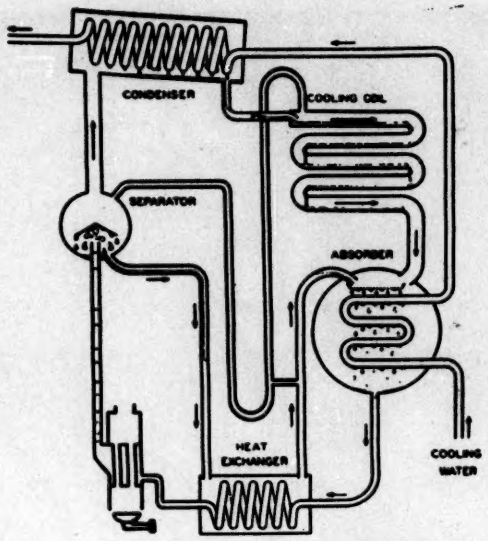
Two 12-cylinder VMC compressors arranged in duplex run at 870 rpm with a 300 hp motor and operate at 90 psig suction and 230 psig discharge for a capacity of 458 tons.

Two 36-in dia. x 7-ft high ammonia intercoolers and one 42-in dia. x 7-ft high unit, serve these systems. Four evaporative condensers are hooked up by pairs for condensing requirements of the two systems. One 36-in dia. x 16-ft, 6-pass ammonia shell-and-tube glycol chillers with a 24-in dia. x 18-ft suction accumulator welded on top are utilized. Each cooler has a capacity of 200 TR based on circulating and cooling 1150 gpm of brine per shell from minus 19.8 F to minus 25 F. using minus 35 F. refrigerant.

Vilter equipment installed at Tropicana's Whitestone, Long Island Terminal includes two 6-cylinder and one 8-cylinder Refrigerant 12 compressors.

See front cover photo for view of the compressor room.

Operation Maintenance of Absorption Systems



SCHEMATIC DIAGRAM OF ABSORPTION UNIT

By I. E. ROWE, Director of Utilization United Gas Corp., Shreveport, La.

This paper was a presentation at the U.S.A.F. Refrigeration and Air Conditioning Equipment Conference held at Wright-Patterson Air Force Base, July 1959

»» THE development of absorption refrigeration units designed especially for air conditioning applications has occurred during the past twenty years, with the greatest acceleration shown during the last half of that period. The publicity resulting from recent accomplishments has possibly caused many people to think that it is something new. Actually, it is the oldest known type of mechanical or man-made refrigeration. The first packaged heating and cooling unit designed for residential and small commercial buildings also utilized absorption refrigeration for the cooling cycle.

Some Installation Statistics

Our company has over 3,000 absorption type air conditioning units in installations owned by our customers. Several other gas utilities have as many or more than this number. The units range in size from 3 to 750 tons and they are found in residences, office and public buildings, hospitals, schools, industrial plants and other similar applications.

The Air Force Academy in Colorado Springs has 1,646 tons of absorption refrigeration operated by high temperature water which is circulated from a central power plant. The U. S. Military Academy at West Point has a total of 911 tons in three buildings. The Idlewild International Airport at New York City has a 6,000 ton installation also operated with high temperature water. Other large absorption installations can be found at the Atomic Energy Commission Sandia base in Albuquerque; Lockbourne Air Force base in Columbus; St. Louis Ordnance Plant, Great Lakes Naval Hospital, Naval Air Stations in Cecil Field, Florida and Norfolk, Virginia and in several buildings at the NACA at Langley Field in Hampton, Virginia. Many other buildings which house agencies and institutions operated by the federal, state and local governments have absorption systems which vary in size from the smallest to the largest units made.

The First Liquid Absorption Systems

For those of you who are not familiar with the absorption cycle, let us digress for a moment to discuss its early development and principle of operation.

The basic principles of absorption refrigeration were recognized by Nairn as early as 1777, but no practical operating machines were manufactured until about 75 years later. The first recorded use of absorption refrigerating apparatus in this country occurred during the War between the States. The North cut off the supply of natural ice to the South, and the Southerners imported several ammonia systems from France. These machines were designed by Ferdinand Carre, who apparently has been credited by historians with the invention of the first continuous flow liquid absorption cycle. In 1867, a man named Rees Reece added two refinements, the analyzer and rectifier, which helped to condense most of the water vapor from the ammonia gas before it reached the evaporator. A number of other refinements were made in the ammonia system during its long period of use, and they are still employed in current designs.

Basic Functions of Components in the Absorption Cycle

All absorption cycles involve four basic processes or steps. Most descriptions of the cycle operation begin with the application of heat

to the generator. The heat may be applied by direct firing, or with low pressure steam or high temperature water. The absorbent enters the generator with the refrigerant in solution. Heat evaporates the refrigerant, and at the exit of the generator, the vapor goes to the condenser and the "boiled out" absorbent goes to the absorber. The refrigerant vapor is liquefied in the condenser, and the heat of condensation is taken away by the cooling water or air.

The refrigerant then flows through a restrictor which seals the relatively high generator and condenser pressure from the lower evaporator pressure. In the evaporator the refrigerant is vaporized, and the removal of the heat of vaporization provides the refrigeration effect necessary for cooling water or air. Connected to the evaporator, and in some designs in the same shell, is the absorber. This vessel receives the "boiled out" absorbent from the generator, and the liquid is usually distributed over an extended surface where it can have the maximum exposure to the refrigerant vapor. Since the absorbent has a very high affinity for the refrigerant, the continuous absorption process tends to reduce the pressure in the evaporator. When the refrigerant vapor is absorbed, heat is generated, and it is called the heat of absorption or dilution. This heat must be removed by circulating water or air. The pressure and corresponding temperature in the evaporator depend on the rate of absorption in the absorber, and this rate in turn depends on the temperature of the absorbent while it is doing its work. The absorbent with the refrigerant in solution flows back again to the generator.

A close examination of the flow directions and temperatures in this cycle will reveal that a relatively cool liquid is leaving the absorber on its way to the generator to be "boiled". Other liquid which has just been "boiled" is leaving the generator on its way to the cool absorber. It is apparent that heat energy and cooling water requirements can be reduced considerably by an interchange of heat between these two liquids. Consequently, all absorption machines have a heat exchanger at this location. There are many other refinements in the absorption cycle, and most of them are related to the specific refrigerant-absorbent combination.

Lithium Salt-Water Systems

In 1934, Servel began work on the development of an absorption refrigeration unit which could be used for comfort air conditioning installations. By 1938, Dr. Albert Thomas of that company had worked out a practical design of an air conditioner with lithium chloride and water. Some test installations were made in 1939, and a number of production models were installed in 1940. The lithium chloride-water combination had many desirable characteristics essential to an absorption system. Its solubility, however, was limited and the solution would crystallize frequently. In the following year, 1941, Servel replaced the lithium chloride with lithium bromide. This change required minor design alterations and a more effective means for reducing the formation and accumulation of hydrogen in the system.

Lithium bromide is considerably more soluble in water than lithium chloride and, consequently, lower vapor pressures are obtainable. It is used today by Arkla-Servel, Carrier, and York. Arkla-Servel units are made in direct fired 3½ and 5 ton sizes for combination heating and cooling, and in 25 ton size as a steam operated water chiller. Direct fired 3, 5, 7½ and 25 ton chiller models are presently under development. The absorber and evaporator are combined in one shell in the chiller models. Carrier's absorption units are made in sizes ranging from 60 to 750 tons. York has sizes which range from 106 to 740 tons. York and Carrier combine their generator and condenser in one shell. All Arkla-Servel, Carrier and York absorption units are water cooled.

Except for the fact that water cannot be used as a refrigerant at temperatures approaching 32° F., it is one of the most ideal refrigerants. It is cheap, non-toxic, and very stable. The operating pressures are favorably low for the air conditioning temperature range. It has the highest latent heat of vaporization of any practical compound. Water-lithium bromide solutions exhibit some of the most desirable characteristics of an ideal refrigerant-absorbent combination. Solutions of the two compounds, however, generate hydrogen at the temperatures normally employed in absorption type air conditioning refrigerating units. If it is not removed from the system, this foreign gas raises the pressure in the entire system and reduces the capacity.

Lithium hydroxide and certain other lithium salts have been used as inhibitors to control the corrosion and resultant hydrogen formation rates. Arkla-Servel uses a palladium cell to remove the accumulated hydrogen from their units. This device utilizes heated palladium diaphragm to diffuse the hydrogen from the low pressure inside the absorber to the relatively higher atmospheric pressure outside. Carrier and York use mechanical pumps on their larger tonnage units.

Small-Ammonia-Water Absorption Refrigeration Units

After a number of years in its laboratories, Carrier assigned to its Bryant division the task of field testing and marketing a 3 ton air cooled ammonia absorption unit. This machine is designed for remote installation outside the occupied space. It makes chilled water which is pumped to a duct type cooling coil with a self-contained pump. A patented liquid transfer device moves the ammonia laden water from the absorber to the higher pressure direct fired generator. A 1/3 hp electric motor drives the fan for cooling the condenser and absorber.

The field testing began in 1957 with a number of installations in residences in Texas. The program was expanded in 1958 with about 75 units in representative locations where air conditioning is required in practically every section of the U. S. The Bryant dvision of Carrier is now producing the 3 ton size for sale through their regular distribution channels. A 4½ ton unit is being tested for limited production next year.

Bryant's air cooled ammonia-water absorption machine may be the forerunner of several similar designs. It is reported that another very large manufacturer is planning to enter the market soon with a remote type air cooled water chiller using the ammonia-water cycle. The new Safety Code for Mechanical Refrigeration recognizes that ammonia systems may be safely installed outside of buildings and residences. A special paragraph prescribes very reasonable installation requirements.

Ammonia has a relatively high latent heat of vaporization (625 Btu per lb. at 50°F.). At 32°F., one volume of water will absorb 1300 volumes of ammonia gas, and at 68°F., it will absorb 710 volumes. Thus, the lower the temperature of the water, the more ammonia it will absorb.

Servicing of Absorption Refrigeration Units

A very large percentage of the total units in our area are in the 3 and 5 ton sizes. Many of our customers request that we service their units, and this work is done on a charge-per-call basis or an annual preventative maintenance contract. We have found that one specialist and helper can adequately service from 100 to 150 units during the peak air conditioning period. These same men service heating systems or do other work when not engaged in work related to air conditioning.

The manufacturers of the larger type absorption units (York and Carrier) have offices and service representatives located at strategic points to cover most of the country where air conditioning is required.

In some remote areas gas utility service representatives have been given special training to render emergency service. York and Carrier also have service contracts when requested by their customers. Two types of contracts are generally offered. One of these is an agreement under which thorough inspections are made at prescribed intervals and during normal shutdown periods. The owner may authorize any necessary repair work which is recommended by the manufacturer at the time of inspection. The other type of agreement provides a preventative maintenance plan. With this latter contract the manufacturer assumes complete responsibility for the maintenance of the absorption unit only or the complete system. All necessary adjustments, replacements or repairs are made at the time of each inspection. The inspections with either type of contract provide an opportunity for the factory service representative to give instruction in better operating techniques where necessary. On many installations factory representatives have conducted extensive training sessions for local operators so they can do all routine servicing necessary.

Potential Service Difficulties

It should be emphasized that an absorption refrigeration unit is not a precision manufactured machine similar to a compressor. The only moving parts are found in simple centrifugal type pumps with mechanical seals. The principal sources of trouble in absorption units are leaks, crystallization, and scale formation where water is used to cool the condenser and absorber. The ammonia-water machines do not have crystallization problems and the air cooled machines do not have water scale problems. It should not be too difficult to prevent leaks in an ordinary piping system which is not connected to vibrating or reciprocating machinery. Crystallization only occurs when there is an abnormal operating condition such as that caused by the failure of an operating control. The use of the term "crystallization" means that the solution at some point in the system becomes too concentrated with lithium salt, and it will not flow. It does not occur where the operating controls are functioning normally. When it does happen, the condition may be easily corrected by (1) the external application of heat, (2) the addition of distilled water or (3) the internal by-passing of dilute water-salt solution into the section which contains the highly concentrated solution.

It is not the purpose of this paper to discuss the relative merits of air and water cooling in refrigerating systems. Both cooling methods have very definite advantages and disadvantages. Relatively few absorption or compressor installations above 15 tons are air cooled, and in many high dry bulb temperature areas water cooling with any type of refrigeration system provides some very desirable operating characteristics. In the high wet bulb belt along the gulf coast, air cooled units have very definite advantages.

Water Treating Methods

After a very careful analysis of this situation in our area, we have concluded that water cooling will be with us for many years. Apparently, others have reached the same conclusion, because significant progress has been made during the past few years in water treating technology.

A section of the engineering department in our company is responsible for water treating at compressor stations, gasoline plants, and in boilers and cooling towers on company owned or leased buildings. Last summer this group was assigned the task of (1) developing a safe and quick method for descaling condensers and absorbers using the system circulating pump and with the least possible damage to any metallic part, (2) evaluating present water treating methods used on customer owned air conditioning systems, and (3) developing a simple and inexpensive water treating device for small tonnage air conditioners.

Our service personnel are very elated over the progress made already on the descaling study. We had always assumed that a treatment with inhibited acid was more effective when the acid was left in the system for several hours. Our water treating experts proved the fallacy of this assumption during their first week of tests. They found that after introducing the descaling solution into the system, the condenser surface temperature would drop to a minimum in a relatively short period of time. If operation continued beyond this point, the salts in the circulating system seemed to redeposit, and after a total of several hours very little actual good was done.

The time required to reach this critical minimum point varies with the initial mineral content of the make-up water, the amount of scale in the system, and the strength of the descaling solution. The new recommended cleaning process begins with the cooling tower pan and piping filled with fresh water. Last year's tests were conducted with varying proportions of Ketone and inhibited muriatic acid. The word Ketone as used here is the trade name of a product rather than the name of a group of organic chemical compounds. It is a chelating agent, and in layman's language this means that its molecules form a ring around the molecules of salts in the water. Ketone is an alkaline solution containing Versene, polyphosphate, chromate and a surface tension reducing agent. Tests are also being conducted with Cheplex which is similar to Ketone except that it is more concentrated. Some of the descaling tests which were run late last year indicate that Ketone and Cheplex may possibly be used without the inhibited acid. This year descaling tests are being made using both Ketone, Cheplex and Versene alone. Versene is a powerful complexing compound which raises the solubility of many salts that normally form scale when their concentrations are increased in water systems. In the petroleum refining industry and in steam power electric generating plants, alkaline descaling chemicals are becoming very popular because they can be used without expensive shutdowns, and they do not attack the metals. They also seem to have better performance characteristics as silica scale removers than the acids.

Study Phosphates

So far we have only done special work with phosphate type water treating compounds because this method seemed to offer the easiest solution for a cheap and simple feeding device. Our studies indicate that the polyphosphates do not seem to perform very well unless the pH of the circulating water is normally low or kept low by artificial means. Again, we generally have the paradox of high alkalinity with the water which tends to scale most. When both alkalinity and hardness of the make-up water are high, it is necessary to operate at lower than normal concentrations. Under such conditions the cost of adequate treatment to permit increasing the concentration ratio can become unreasonable, and blowdown may be the only practical method for controlling scale formation. The preceding statement is based on the assumption that 2 to 5 cycles of concentration are normal and economically practicable. Further studies are being conducted with the polyphosphates and other sequestering compounds this year. Work will also be continued with chelating agents, including Ketone and Versene as scale preventers.

The value of adequate blowdown or bleed off cannot be emphasized too much. When the mineral content of the make-up water is known, uniform blowdown rates can be established for small systems having the same tonnage ca-

recognize this?

Widely employed as a flow control device for all refrigerants, the solenoid valve permits flow control in response to an electric signal. Solenoid valves should be used where a temporary interruption of liquid flow is required, due to a load variation. With multiple systems, solenoid valves are employed to prevent the transfer of refrigerant from high temperature evaporators, or refrigerant condensation in the low temperature evaporator during an "off" cycle. They are also used as shutoff valves for pneumatic control systems, for heat pump reversing valves, and in brine systems to cut off the flow of brine to the coils.

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pacity. This simplifies the job for the service man on standard installations. There are many installations, however, with atmospheric type cooling towers or with large absorption type chillers or compressors. The service man cannot adjust for the proper blowdown on these unusual systems unless he can test for the cycles of concentration in the cooling tower pan. A simple test kit can be bought for a few dollars to determine the chloride ratio of the circulating water to the make-up water. Chloride salts are highly soluble and it is assumed that none have been deposited as scale. This ratio is almost universally used for determining cycles of concentration in cooling tower and boiler waters.

Some of the sequestering compounds such as the polyphosphates will benefit to a small degree with water having relatively high silica content provided the proper blowdown and treatment feed rates are maintained. At these optimum conditions the calcium may be complexed as tri-calcium phosphate, and the formation of calcium silicate will be minimized. The safest way to prevent the formation of this very difficult-to-remove scale is to hold the silica concentration in the circulating water to a maximum of 200 ppm, preferably lower should high magnesium concentrations be present. If the silica concentration in the circulating water can be kept below 150 ppm, the descaling job will be much easier. Under these conditions the cleaners containing the sulphamic acid are more effective, whereas, at higher silica concentrations such cleaners have been ineffective and too expensive to justify their use.

Current Research and Development of the Absorption Cycle

It is impossible to give an accurate report on all of the research and development work involving absorption refrigeration. The American Gas Association is spending a considerable sum of money with several agencies. These efforts are directed toward long range possibilites as well as current problems. Several very large manufacturers of air conditioning and refrigeration equipment are spending huge sums on varied programs. Suppliers of the basic materials used in absorption systems such as refrigerants and absorbents are also engaged in extensive research activities.

Until recent years, the search for ideal refrigerant-absorbent combinations was very nearly conducted on a "hit-or-miss" basis. Today, much more is known about the desirable characteristics of ideal combinations. It is now possible to write a chemical and physical specification for either component or both. There are great possibilities with three and even four compounds operating in one system simultaneously. Current projects include the study of water and lithium bromide mixed with lithium chloride, and water and lithium bromide mixed with calcium chloride. Other investigations are being made with water and lithium iodide.

A close examination of the absorption cycle will reveal that the refrigerant is vaporized twice in a complete circuit. It has already been emphasized that this liquid or gas should have a very high latent heat of vaporization. If the refrigerant could be separated from the absorbent by some process other than vaporization, considerably less heat input might be required.

Some liquids are completely miscible below a certain temperature, but become immiscible above a higher temperature. If two liquids could be found which are miscible at temperatures existing in the absorber and heat exchanger, it is possible that they could be separated by the application of a relatively small amount of heat. This phenomenon is called the "lower critical solution temperature", and its use in an absorption cycle is being investigated in a current A. G. A. research project. Basic research in absorption refrigeration has already provided the information necessary to write the specifications for these two liquids. Water may very well be one of the pair.

Another approach toward elimination of this problem of double vaporization has been the objective of an accelerated research project during the past few years. It utilizes the multiple effect principle of evaporation. Some of the refrigerant is evaporated by externally applied heat in a "first effect generator". Instead of passing this gas to a condenser where it would require cooling water for condensation, it is passed into a "second effect generator" where the heat of condensation is used to evaporate the remainder of the refrigerant. Thus, both heat input and cooling water requirements are reduced. This new design is probably best adaptable to larger tonnage sizes because a solution pump and several controls are required which may not be economically feasible in small units.

Other Research and Development Work

In the next few years you will hear more about three prime mover developments. Parallel projects are now under way for air and water cooled internal combustion engines which will operate 10,000 hours without service. In each project the cooperating manufacturer is assuming the responsibility for matching a 110 volt motor starter and a direct connected refrigeration compressor with the engine. These units can be used for summer cooling or for operation as heat pumps during the heating cycle. The heat from the engine jacket and exhaust will eliminate the defrost problem experienced with current models. Modulated speeds can be provided where necessary. A free piston unit with the power and compressor pistons at opposite ends of a rod shows great promise for 3 to 5 ton mass produced competitively priced units. Some recent studies in which gas turbine driven centrifugal compressors have been combined with absorption units on large installations give fuel economies far lower than with any type of available equipment. These compressor units can also be operated on reverse cycle.

"Full speed ahead", is the order for two other projects which have very great possibilities for our industry. One is for the development of thermo-electric refrigeration and the other is the generation of electricity directly from heat energy with fuel cells or by thermionic conversion.

Refrigeration and Air Cooling Play Important Part in—

Kitchens of Sara Lee Bakery

»» THE Kitchens of Sara Lee, Inc., Chicago-based quality food company, officially marked completion of its "dream" bakery plant on Chicago's northwest side.

Charles W. Lubin, president, said the building represents "fulfillment of a life-long dream to build and equip the finest bakery processing plant in the world."

The building, which cost $4,000,000 to construct and equip, is located at 5353 North Elston Avenue, Chicago. It is a one-story, trapezoid shaped structure containing 140,000 square feet including a new addition. It was designed and constructed by A. Epstein and Sons, Chicago.

The brand new air-conditioned bakery represents the fourth location for the nine-year old Kitchens of Sara Lee. In 1951, the original bakery covered only 2,000 square feet. In 1952, the company quadrupled its space taking 8,000 square feet on Chicago's north side; and in April, 1953, the company moved again to a 35,000 square foot plant.

The entire plant is air conditioned and completely sealed off from outside dust, dirt, and heat. Filtered air conditioning throughout the building eliminates all impurities and maintains constant, controlled temperature and humidity for control of the products as well as the ingredients.

Outstanding feature is the 40,000 foot processing area where the Sara Lee products are made.

Receiving Area— Perishable Ingredients

Sara Lee receives daily shipments of all perishable ingredients. A bulk fluid system was installed at a great expense to give complete quality control and maximum sanitation. The system consists of four 1500 gallon and two 500 gallon stainless steel lined, jacketed, refrigerated and thermostatically controlled tanks for storing daily deliveries of fresh milk, fresh whole eggs, and fresh egg yolk.

Each morning, daily requirements of the liquid ingredients are received from local dairies and egg-breaking plants, and are pumped through stainless steel pipes into the tanks. From the storage tanks, the fluids are pumped directly into the mixing room as needed. Electronic controls in the mixing room operate the entire system. None of the fresh products are ever exposed to air until reaching the mixers.

Other fresh ingredients including pecans, cream cheese, yeast, sour cream, and butter are also received at this point. The ingredients are immediately placed in refrigerated rooms with the receiving doors opening directly into the warehouse for quick access, and the service doors leading into the mixing rooms.

Receiving Area— Bulk Ingredients

A section of the warehouse is composed of specially designed bulk storage bins for storing bulk flour and sugar. The bulk ingredients are pneumatically transferred from railroad cars on a private siding directly into the storage bins. From the bins, the sugar and flour are distributed pneumatically to the automatic scales in the mixing room.

When the proper weight is attained in the over-head scales in the mixing room, the motorized valves on top of the scales automatically shut off, returning any surplus material to the proper storage bins. No dust or other foreign particles can reach the contents of the bins.

Mixing And Make-Up Room

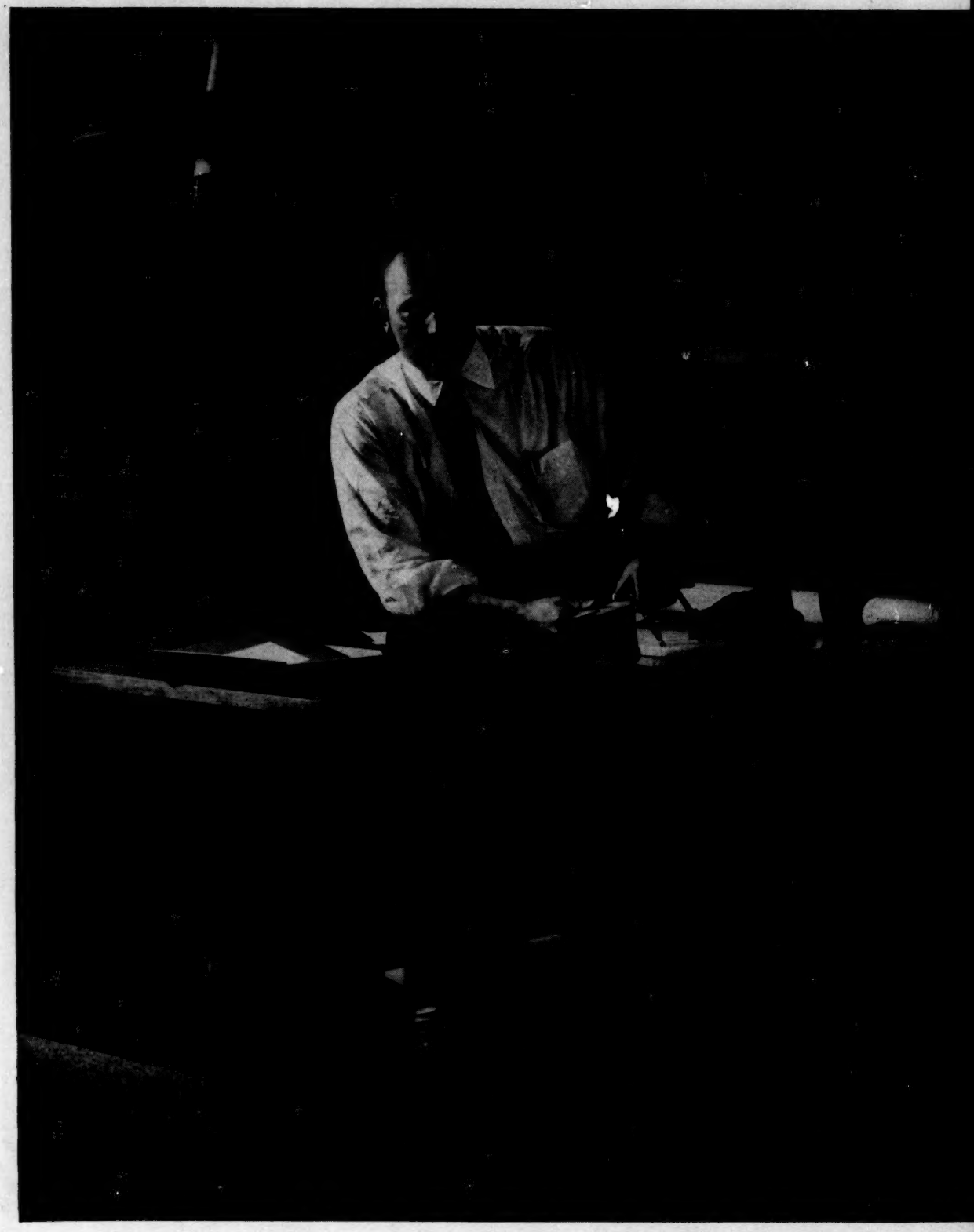
The temperature in this room is maintained at a constant 70-72 degrees temperature all year round, regardless of outside weather. In this room is done all the mixing for the Danish doughs used in Sara Lee coffee cakes, as well as the mixing of the other cake batters, icings, fillings, and sour cream topping used on Sara Lee Cream Cheese Cake.

The dough mixing machines are specially designed, imported Swiss machines that simulate hand mixing methods. All equipment in the plant was designed to insure uniform quality of the finished cake products. Above the mixing machines are automatic scales and the pneumatic pipes through which the various ingredients are brought to the mixers from the receiving and warehouse areas.

After the Danish doughs are mixed, a long, tedious and tender process follows, requiring several sheeting operations. The rich 93-score butter is rolled into the dough so that the final dough ends up with 81 folds or layers of dough and butter. The Danish dough is then placed in a refrigerated retarder overnight and is used for the next day's coffee cakes.

The non-Danish batters go directly from the mixing machines to

DOW | INSULATION



THIS MAN KNOWS STYROFOAM®

AND LOW-TEMPERATURE INSTALLATION, TOO

HE'S AN APPROVED INSULATION CONTRACTOR, typical of the special group of low-temperature insulation contractors that Dow has selected for their outstanding experience and abilities in installing Styrofoam*. Each Approved Insulation Contractor listed below has a reputation for top-quality workmanship. All 77 of these firms are thoroughly familiar with Dow recommendations for installing Styrofoam, and they are committed to follow these recommendations on every job.

Consult an Approved Insulation Contractor when you're planning your next freezer or cooler room. The superior *insulating* performance of Styrofoam, teamed with the superior *installing* performance of an Approved Insulation Contractor, is your assurance of a top-quality job.

*DOW'S TRADEMARK FOR ITS EXPANDED POLYSTYRENE.

SAVE THIS LIST FOR REFERENCE

For the best low-temperature installation, get in touch with the Approved Insulation Contractor near you.

ALABAMA
Birmingham
Badham Insulation Company, Inc.

ARIZONA
Phoenix
Barrett & Homes
Tucson
Arizona Insulation Company, Inc.

ARKANSAS
Little Rock
J. C. Lewis Company

CALIFORNIA
Fresno
Fiberglas Eng. & Supply Div.
Los Angeles
Armstrong Contracting & Supply
Fiberglas Engineering & Supply Co.
Los Angeles Cork Company, Inc.
Los Angeles Ind. Bldg. Materials, Inc.
North Sacramento
Fiberglas Engineering & Supply Div.
San Francisco
Fiberglas Engineering & Supply Div.
Peterson-Cobby Insulation, Inc.

CONNECTICUT
Bloomfield
W. L. Walker Company

COLORADO
Golden
Denver Lining Company

FLORIDA
Haines City
R & S Insulation Company
Jacksonville
Insulation Contractors
Miami
L. L. Jackson, Inc.
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GEORGIA
Atlanta
Asbestos Insulation Company, Inc.

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KANSAS
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Mid-Continent Ind. Insulation, Inc.
Preston Refrigeration Company

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Louisville
Cardinal Industrial Insulation, Inc.

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McCarty-Branton
Shreveport
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MAINE
Lewiston
Northeastern, Inc.

MARYLAND
Baltimore
F. V. Vleck Company
Cheverly
Frank Heintze Company, Inc.

MASSACHUSETTS
Walpole
Allied Cork, Inc.

MICHIGAN
Detroit
Chrysler Koppin Company, Inc.
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MINNESOTA
Minneapolis
General Adhesives Products Co.
Hauenstein & Burmeister, Inc.
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MISSOURI
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Omaha
Low-Temp Insulations

NEW YORK
Albany
Cork Insulation Contracting Co.
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NORTH CAROLINA
Asheville
Bonitz Insulation Company of Carolina-Tennessee, Inc.
Goldsboro
Bonitz Insulation of Eastern Carolina, Inc.
Greensboro
Bonitz Insulation Company, Inc.

OHIO
Cleveland
Ross Insulation, Inc.
Dayton
C. W. Booher Company
Toledo
Service Products, Inc.

OREGON
Portland
E. J. Bartells Company, Inc.
Fiberglas Engineering & Supply Div.

PENNSYLVANIA
Catasauqua
Tri-City York
Hummelstown
David R. Trout
Kingston
Culp Industrial Insulation Company
McKees Rocks
Geo. V. Hamilton, Inc.
Telford
Walter R. Dorn Estate

RHODE ISLAND
Providence
Rhode Island Covering Company

SOUTH CAROLINA
Columbia
Bonitz Insulation Company of South Carolina

TENNESSEE
Memphis
Chris Fiedler Company, Inc.
Nashville
Young Sales Corporation

TEXAS
Dallas
Southwest Cold Storage Vault Co.
Houston
Gulf Insulating Corporation
Amarillo
Young Sales Corporation

VIRGINIA
Norfolk
C. C. Foreman & Sons, Inc.
Roanoke
Whitescarver Engineering Co., Inc.

WASHINGTON
Seattle
Associated Asbestos, Inc.
Fiberglas Engineering & Supply Div.
Spokane
Fiberglas Engineering & Supply Div.
Yakima
Reese & Sons

WEST VIRGINIA
Charleston
Asbestos & Insulating Co., Inc.

WISCONSIN
Madison
Industrial Material Company
Milwaukee
Sprinkmann Sons Construction Co.
Manitowoc
Northwestern Asbestos & Cork Insulation Company, Inc.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

the homogenizing machines for final mixing to achieve the fine, close, and even texture with just the right amount of air that gives Sara Lee cakes such good eating qualities.

From the homogenizing mixers, the batter is pumped through stainless steel pipes to the depositing machines in the baking room. The depositing machines put just the right amount of batter in the aluminum foil containers, which then go into the bake ovens.

On one side of the mixing and make-up room is the make-up line which was specially designed by Sara Lee to control the uniformity, quality, and texture of their coffee cakes. This is the only line of its kind in the world. The Danish dough is delivered from the refrigerated retarder rooms where it has been kept overnight and is then sheeted through the special make-up line in continuous strips. The bottom dough sheet receives a special filling after which the top dough sheet is gently deposited over it and later sized. The dough is then cut automatically to desired weight and size, following which the cakes are made up by hand, deposited in foil pans, and automatically discharged on to an especially designed conveyor and elevator that carries the coffee cakes into a custom-built proofer to allow the dough to rise before baking.

From the proofer, the dough pieces are carried into the baking room where they are automatically sprayed with whole fresh eggs, and then showered with pecans, streusel or other toppings. An automatic transfer then carries them into the ovens for baking.

Baking Room

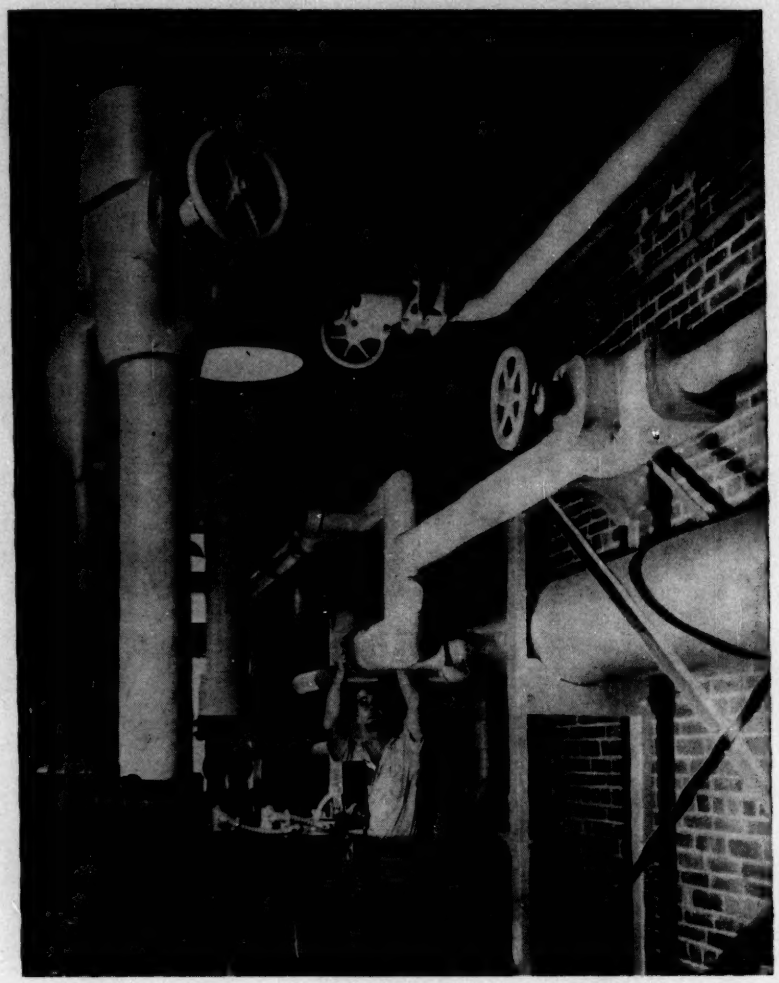
The three ovens in the baking room have a capacity of many thousand cakes per hour. After the coffee cakes receive their toppings they go into the ovens and are automatically discharged at the other end, one row of carrying trays at a time, and are mechanically transferred into the after-coolers. There is one cooler for each of the three ovens. The non-Danish cakes also go directly from the ovens into the coolers.

The three automatic coolers receive the products at temperatures varying from 212-220 degrees. Inside the coolers, clean washed and filtered air cools the cakes to just the right temperature for icing and packaging.

From the coolers the cakes are transferred to the icing machines that deposit just the right amount of icing in the right pattern for all Sara Lee iced cakes. From here the cakes are transported into an especially designed icing cooling tunnel where the surface of the icing is properly conditioned for packaging. After leaving this room the cakes are now ready for packaging.

The packaging lines automatically deposit the closure covers on the finished cakes and seal them close. The closed foil pans are then placed in cartons and are ready for shipment.

Insulation With Vapor Barrier Eliminates Condensation On Refrigerant Lines



Application of Armaflex Insulation—the product which will be featured in the *Armstrong Cork Company exhibit at the 1960 National Plant Maintenance and* Engineering Show and Conference January 25-28. Armaflex in sheet form was *used to insulate the cold lines and tanks in the refrigeration equipment room* at Richardson & Robbins Company Plant, Dover, Delaware. Despite severe humidity conditions, condensation has been eliminated by Armaflex.

Armaflex was developed several years ago by Armstrong's Research and Developemnt Center as a one-step method of applying efficient insulation with a vapor barrier. It comes in tubular form for pipe covering and in sheet form for covering large pipes and tanks.

Refrigeration and Air Conditioning Equipment

Preventive Maintenance

By LIONEL G. KING,
Director of Service Education,
Worthington Corporation,
New Jersey

This presentation was prepared and presented to the U.S.A.F. Refrigeration and Air Conditioning Equipment Conference held at Wright-Patterson Air Force Base.

»» THE necessity for protecting both the well being of employees and the company's investment of timely service to plant and equipment, needs no justification. Similarly, the costly production and operating shutdowns resulting from poor and inefficient maintenance practices, are also so familiar that they require no examination.

However, the problems of how and when to apply these protective measures are both numerous and, at times complex. To overcome these problems one should develop a system which provides management with current, precise maintenance control, applicable to the system, by automatically scheduling maintenance needs, allocating labor and materials for these needs and also keeping permanent records of all repairs and cost information.

What Is Preventative Maintenance?

To describe the major divisions of maintenance operations, two terms are generally used; one is "preventative" and the other is "corrective". Preventative maintenance means the anticipation and correction of possible equipment failures before they occur. Corrective maintenance means the repair and rehabilitation of equipment only after it has broken down. This latter method is a very costly program to follow. I would like to point out here, that the reason for choosing the "Preventative" approach to the maintenance problem is based upon its proven value in initiating realistic maintenance control measures applicable to each individual system and following through with a conscientious effort by all concerned.

Although methods of production have improved tremendously during the past several decades, maintenance practices have not kept pace with the increasing demands of industry. For example, it has been the accepted practice in many plants to wait until a piece of equipment breaks down completely before attempting repairs or rehabilitation. In many cases, a cursory, periodic inspection suffices to assure maintenance repairmen that equipment is functioning properly. Furthermore, many plant engineering departments rely solely upon machine operators to perform maintenance operation for which they are not properly trained.

Such conditions should not exist in situations where efficient continuous plant operation is a prime factor.

In order to properly and efficently carry out a program of "Preventative Maintenance" one must first provide, or secure, the proper training of all departmental personnel including "Top Management" of this section. They should be thoroughly informed along the lines of project information. A training which is provided by the manufacturers of the equipment. This information includes all pertinent data relative to the design, construction and all general physical information concerning the respective apparatus. This training should run a pattern of continuity and not be a haphazard program of hit or miss meetings. The men, to be of any value in this type of program, should keep an open mind and be interested in gaining all the information they can concerning proven and new techniques of solving problems that may arise from time to time. They should be thorough in their scrutiny of the operating conditions, looking for all possible signs of troubles and applying corrective measures at once.

A reliable maintenance program calls for an efficient programming of:

1. Inspection and test procedures pertaining to trouble shooting.
2. Inspection Records and check lists.
3. Emergency stock of essential replacement parts.
4. Properly trained and tooled personnel.

"Preventative Maintenance", as previously stated, is looking for and correcting minor system deficiencies before they cause serious breakdowns. In order to accomplish the end results we are aiming for the maintenance repairman must methodically and conscientiously check the operating conditions of the system in general, and, like a physician, to whom I like

to compare him to, start at the heart of the system. A physician, in giving a general physical check-up, starts by checking the heart action, the pulse and the body temperature of the patient and from the readings he receives from these three points he determines where to look for any chronic or acute conditions that may be causing the patient worry and discomfort. The maintenance repairman should also start with the "heart" of the system and follow in this same vein. Starting the check-up at the condensing unit which is the heart of the system. Any system defects are readily reflected back to the compressor, and unless corrective measures are used immediately, to alleviate these conditions, the compressor will suffer seriously, eventually breaking down, resulting in costly repairs and expensive loss of production time. The maintenance repairman should check and record the following items on each of his visits, observing very carefully any deviation from normal.

Check List

1. Operating discharge and suction pressures.
2. Operating discharge and suction temperatures.
3. The overall suction superheat at the compressor.
4. The oil level in the crankcase.
5. The condition of the oil in the crankcase (dirty or foamy).
6. The operating effective oil pressure of all compressors having forced feed lubrication.
7. The operating surface temperatures of the compressor in general such as
   (A) Crankcase temperature
   (B) Seal housing temperature
   (C) Cylinder temperature
8. The condition and tension of the belts.
9. The condition (physical and mechanical) of the compressor and motor sheaves.

The maintenance repairman should train himself to recognize any deviations and quickly determine where the trouble originates, following through with the necessary corrective measures to alleviate the conditions prevailing at the time of the check-up. The corrective measures should follow along the lines of good common sense, proven standard practices and in accord with the manufacturers recommendations pertaining to that particular component of the system.

The next component of importance that should be carefully checked out is the condensing unit motor. These motors, as a rule, are taken for granted and the result is that they receive very little attention. Here again system troubles are reflected in excessive current draw that, in time, breaks down the insulation on the windings resulting in an eventual system breakdown due to motor burnouts. The motor should be checked for:

1. Bearing temperature
2. Current draw at motor terminals
3. Proper lubrication

Along with the motor, all electrical components of the control system should be checked thoroughly for:

1. Proper setting of controls
2. Proper operation of controls
3. System check for frayed or broken wires and system grounds.

This is important for the controls are the nerve system and their impulses produce the end results that the system was designed to produce and if they are not operating in proper coordination and sequence, serious damage to the operating components can be the eventual result. Next in line are the "unitary safety controls". These again should be checked for:

1. Proper setting
2. Proper operation

These controls were designed and installed on the condensing unit for "safety" reasons. They were not meant to be used as operational controls and in this vein it is very important that they be checked out by being made to operate, producing the abnormal conditions manually that they are set to protect against. If the settings have drifted from their original setting due to aging of the springs or vibrations of the condensing unit, they should be reset

MODERN NIAGARA CONDENSERS PAY FOR THEMSELVES IN EXTRA SAVINGS

These Niagara condensers are lower in first cost and assure you of trouble-free automatic refrigeration. Special features: "Aeropass" coil removes super-heat to give you condensing at lower temperatures and prevent loss of capacity by the scaling of condenser tubes; "Oil-out", oil separator between pre-cooling and condensing coils gives you always an oil-free system; "Panel-Casing" construction gives you access to every part of the condenser for inspection and maintenance. Operating engineers say these condensers "save half the work of running a refrigerating plant". Managers who know costs and profits prove that Niagara condensers bring them great returns in power savings, water savings and reduced maintenance expense.

Write for Bulletins 131 and 142.

NIAGARA BLOWER COMPANY

Dept. IR-2, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

to the manufacturers recommended settings. Here again these safety controls indicate trouble whenever they shutdown the system. This trouble should be located and corrected immediately. The control should never have its setting raised or lowered to put the system back on the line unless the control has drifted. The reason for shutdown should be carefully checked out, found and corrective measures used at once, otherwise serious damage, with the possibility of injury to nearby personnel can be the eventual result. These safety controls include the high pressure control, the low pressure control, the oil failure switch on forced feed lubricated compressors, and crankcase heater thermostats. The settings on these controls should be maintained at the manufacturers published limitations. Next in line, and usually the source of trouble, is the heat absorbing and heat rejecting components of the system. These are the low side cooling coils in:

1. Air handling units
2. Water or brine chillers

And the condenser coils in:

1. Shell and tube condensers
2. Evaporative condensers

It is very important that the coil surfaces are kept clean and free of all dirt, soot, lint and scale.

Dirty cooling coil surfaces cause suction pressures to fluctuate drastically resulting in:

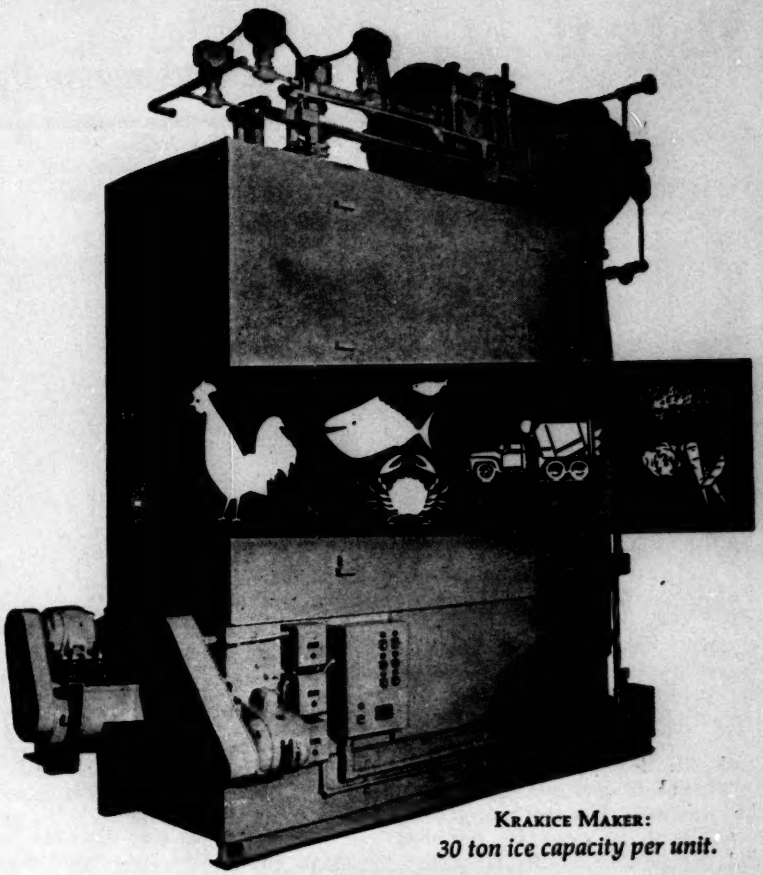
1. Excessively high suction superheat
2. Expansion valve "hunting", and eventual periodic liquid or oil slugging.

Dirty condenser coil surfaces excessively high discharge pressures and temperatures resulting in:

1. Carbonizing of lubricating oils and forming sludges
2. Wire drawing of valve reeds and seats of valve plates
3. Wire drawing of valve needles and seats
4. Excessive wear on cylinders, rings and pistons due to extreme thinning of the lubrication oil
5. Broken crankshafts.

In line with our low side heat transfer equipment one should check the refrigerant flow controls. These too wear, it is a very slow

Continued on page 30



KRAKICE MAKER:
30 ton ice capacity per unit.

New Kohlenberger

KRAKICE MAKER

Solves Any Crushed Ice Requirement

Poultry, fish, concrete aggregate, vegetables ...
Wherever crushed ice is used there's a place
for Kohlenberger's new Krakice Maker.
Now you can get higher ice yield per cubic ft. of space
occupied. Kohlenberger's Krakice Maker delivers clearer
crushed ice in larger quantities faster than conventional
models. No fine adjustments are necessary and
the need for knives or scrapers to remove ice from plates
has been eliminated. Available in 15, 30, 45 and
60 ton units. Write for detailed information.

When quality and dependability count... contact Kohlenberger!

Kohlenberger services include:
Equipment Manufacture • Refrigeration System Design
Plant Layout • Field Erection

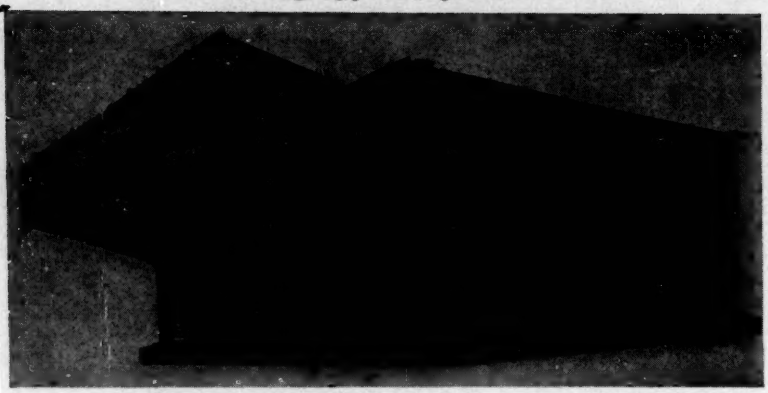
KOHLENBERGER ENGINEERING CORPORATION FULLERTON • CALIFORNIA

ENGINEERS
MANUFACTURERS
CONTRACTORS

1610 COMMONWEALTH AVENUE, FULLERTON, CALIFORNIA

New Products Designed to Improve Operation

Ceiling Type Evaporator



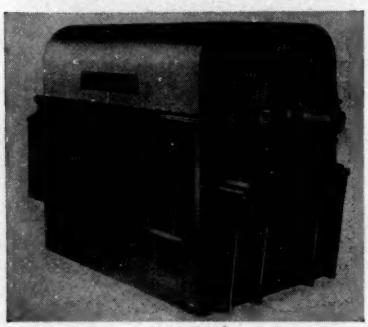
IMECO has just put on the market a new line of space coolers arranged for ceiling mounting, resulting in a saving of floor space. Provided with a fin coil, in a variety of fin spacings and rows deep, any desired balance of air volume and coil capacity can be achieved. Casings are sturdily constructed and can be furnished hot dip galvanized after fabrication. Fan wheels, housings, eliminators and discharge cowls can also be furnished hot galvanized after fabrication.

Coils can be arranged for thermal valve, flooded operation with surge drum and float, liquid recirculation and for either ammonia, Refrigerant 12 and brine.

Air volumes run from 2500 cfm to 28,000 cfm and tonnages (15°) 5 to 30 tons. Bulletin 100A available.

Gyrol Fluid Drive

A NEW line of adjustable speed Gyrol Fluid Drives, developed specifically for use with "on-the-shaft" boiler feed pump drive arrangements, is now available from American-Standard Industrial Division, Detroit 32, Michigan. "On-the-shaft" refers to



the arrangement whereby the boiler feed pump is driven directly from the main turbine generator shaft.

Designated Type VS Class 7, the new Gyrol units are designed specifically for the heavy duty required of boiler feed pump drives. They provide a stepless, adjustable speed control. The adjustable speed feature saves power over the entire operating range.

The new Class 7 units are available for use with any size boiler feed pump. Standard units are available for either 3600 rpm or 1800 rpm operating input speed.

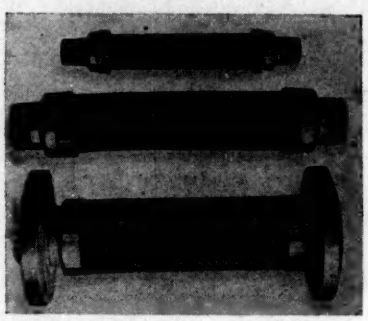
Fluid Drive shaft height is matched to the centerline height of the main turbine shaft for the simplest possible floor mounting. The Class 7 unit is designed for below-floor installation of auxiliary cooling equipment and related piping. This arrangement keeps the turbine floor free of auxiliary equipment.

Flexible Connectors

A SERIES of new flexible metallic connectors has just been introduced by the Pennsylvania Flexible Metallic Tubing Co., 7200 Powers Lane, Philadelphia, Pa.

These Penflex flexible connectors have been developed for quick, efficient operation of pump installations, hot water systems, and steam systems where thermal expansion and vibrations are problems. They have been tested for the correction of pipe misalignment, as connectors to absorb pipe expansion in steam and hot water lines and on pumps where the vibration of the unit must be dampened so as to prevent unwanted noise and vibration being transmitted along the lines to other parts of the building.

Performance data proves the design and construction of the couplings and flexible tubing used in these new connectors have resulted in higher operating efficiency, the overall cost of the connectors are less and



they have withstood longer periods of service in all types of installations.

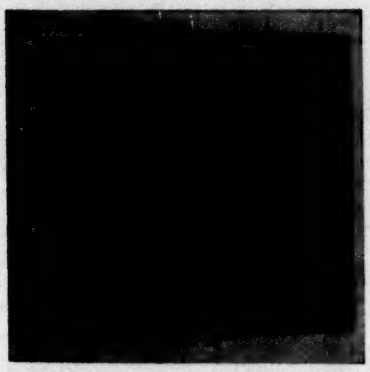
These new Penflex Flexible Connectors are available in bronze and stainless steel. The bronze connectors range in size from 1/2" to 4" i.d. and the stainless steel from 5" to 12" i.d. These connectors will stand pressures from 125 psi, to 600 psi. varying with the tube i.d. and the material of construction.

Full technical details on these new flexible connectors may be obtained by writing to Pennsylvania Flexible Metallic Tubing Company, 7200 Powers Lane, Philadelphia, Pa.

Walk-In Coolers

FOUR sizes of self-contained sectional walk-in refrigerators, with refrigeration units engineered for all types of application — but especially suitable for cooling and storing at low or normal temperatures — are being introduced to the trade by Victor Products Corporation of Hagerstown, Maryland.

Victor Products, a pioneer in refrigeration equipment, has engineer-



ed these units so that there is absolutely no guesswork on anyone's part. All models have self-contained refrigeration systems, balanced in capacity for correct cooling temperatures, according to the type of application for which they are to be used.

All models have weather and rust-resistant heavy galvanized steel interiors and exteriors, with satin aluminum finish on exterior. Standard equipment includes interior floor drain for quick wash-down. The walk-ins are vermin proof and sealed against moisture and contamination, with a double seal on all panel joints.

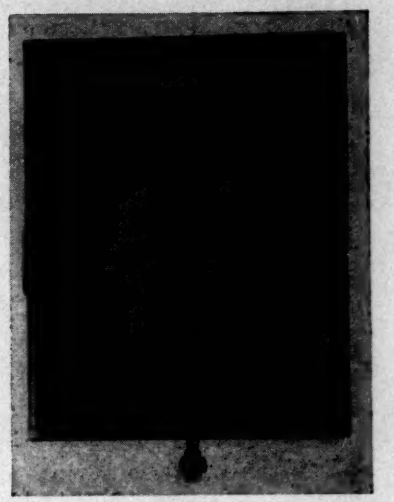
All models are equipped with plug type door, right hand closing, which includes heavy duty galvanized hardware with ball bearing hinges and self-acting roller latch, with inside release handle.

A complete brochure and prices may be obtained by writing Victor Products Corporation, 901 Pope Avenue, Hagerstown, Maryland.

Recording Instruments

WEKSLER Instruments Corporation, Freeport, N. Y., has announced a new line of temperature, pressure and humidity recording instruments featuring ease of reading and dependable accuracy throughout the entire working range. These instruments, contained in completely redesigned aluminum cases with gray hammertone finish, are available in 8" chart size with one to three pen systems; in 10" or 12" chart sizes with one to four pen systems; in hand wound or electric chart drives for 12 hour, 24 hour, 7 day and 31 day revolution.

Temperature recorders are mercury, liquid, gas, or vapor actuated for high speed of response and accuracy with system and movement of all stainless steel, with sensitive air bulb or union connection, or with brass or



stainless steel separable sockets. Supplied in all standard ranges from minus 100° Fahrenheit to plus 1000° Fahrenheit.

Pressure recorders contain specially heat treated spiral wound bronze, beryllium copper, alloy or stainless steel bourdon springs with all stainless steel movement and micrometer adjustment. Supplied in all standard ranges from 30 inches vacuum to 10,000 psi.

NOW TER BUNKER ICING . . . AT LESS COST

with new

Mobil Icer

Truck-mounted Mobil Icer operates in railroad yards, on sidings, at shipper's docks, anywhere a truck can go.

ADAPTABLE TO ALL BUNKER ICING OPERATIONS

Saves valuable time on every job. Eliminates shuttling of cars and break-up of trains for initial icing or re-icing of cars . . . also, most efficient for icing cold storage bunkers and pre-cooling chambers.

FAST TWO MAN OPERATION

Mobil Icer easily handles 300 lb. blocks of ice at the rate of 20 to 25 per minute. Twin-drum design uniformly breaks blocks of ice into an ideal size for bunker icing (approximately 37½ lb. cubes with little or no fines). Hydraulic controls quickly change Mobil Icer to deliver coarse crushed ice for topping off bunkers.

Get the full money saving story.

Write for FREE literature today!

CONVEYCO

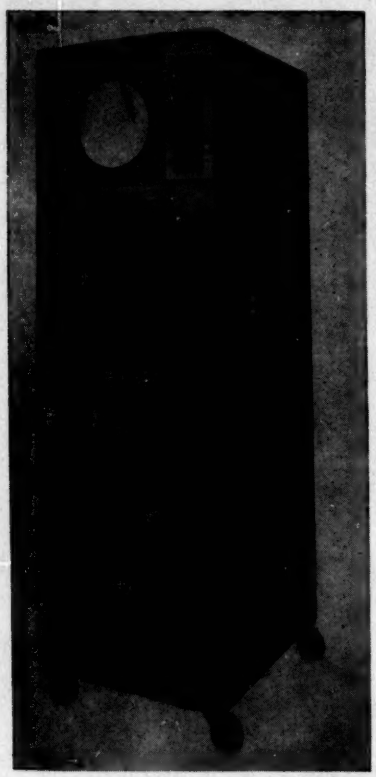
THE CONVEYOR CO.

New Products cont.

Humidity recorders offered are of two types: The direct reading Hygrograph with hair element and the Hygrometer with wet and dry bulb. Standard ranges: 0/100 F. and 0/-100% relative humidity.

For information on Recording or indicating instruments, write Weksler Instruments Corporation, 195 East Merrick Road, Freeport, L. I., N. Y.

Mobile Environmental Chamber



A NEW mobile environmental chamber with a range from -125°F. to 350°F. has wide application in research, testing and conditioning of parts and products. Known as Model AF-1.5-125+350, it is offered by Webber Manufacturing Co., Inc., P. O. Box 217, Indianapolis 6, Indiana.

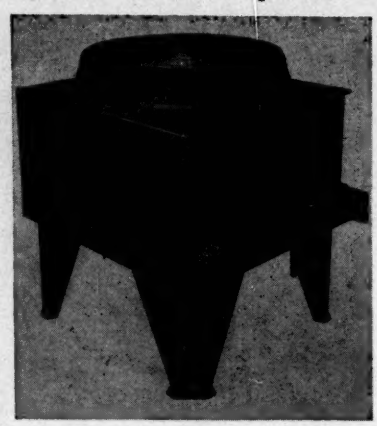
Exclusive entrance ports at the door for instrument cables eliminate the usual inconvenient feed-through ports and terminal panels. Temperatures can be lowered from 350°F. to -100°F. in 50 minutes, and raised from 100°F. to 350°F. in 30 minutes. Accuracy is plus or minus 2°.

Features include a 24-hour recording chart, interior lighting, multi-pane thermal glass assembly in the door, hermetically sealed heating elements, special safety controls, stainless steel interior, 16-gauge steel exterior with baked finish, plus six exclusive patented features.

Power requirements are 220 volts, single phase, 60 cycle; or 220 or 440 volts, 3 phase. Interior dimensions are 14" x 14" x 14". The unit requires floor space of only 26" x 32".

Air Cooled Condensers

ANNOUNCEMENT of a new type air cool blower condenser was made recently by Dunham-Bush, Inc. Called an 'LSBC' (Low Silhouette Blower Condenser), the unit was designed for use in rooftop locations.



The air movement up and out keeps noise at a minimum. The shape allows for location on most roofs with a safe pounds-per-square-foot loading, eliminating costly reinforcing of roof members necessary to support other type units.

This unit can be located anywhere without regard to prevailing wind.

Models are available from 5 to 53.5 tons. Complete specifications can be obtained from Dunham-Bush, Inc., 179 South Street, West Hartford, Connecticut.

Asbestos Gasket Tape

A DOUBLE-SEAL asbestos gasket tape, designed for many industrial usages requiring a uniform gasketing that fits around bolts or studs to form an efficient double seal, has been announced by Union Asbestos & Rubber Company, Fibrous Products Division, Bloomington, Illinois.

With this new gasketing tape, it is no longer necessary to make two separate gasket applications on either side of bolts or studs, or to perforate broad gasketing before use.

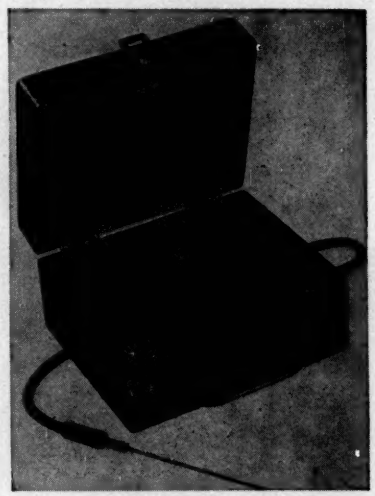
The tape is available in three types —a plain wire inserted folded asbestos tape with an open lattice, or bolt space center (style 746); a plain wire inserted asbestos tape woven flat to desired dimensions and bolt space openings (Style 738); and a plain woven non-metallic asbestos tape (Style 748), similar to Style 738.

For additional information on these new double-seal asbestos gasket tapes,

write Union Asbestos & Rubber Company, Fibrous Products Division, 1111 West Perry Street, Bloomington, Illinois.

Indicating Pyrometer

ILLINOIS Testing Laboratories Inc., is introducing a new version of a portable indicating pyrometer. It is primarily intended to measure temperatures between minus 40°F. (-40°F.) and 200°F. It does this by means of two scales or arcs in order to provide 1°F. per scale division and therefore readability to at least the nearest ½°F.



The "Alnor" type 2300-B Pyrometer is the only Pyrometer primarily aimed at indicating temperatures which are not far from normal room temperatures.

Because a selection of interchangeable thermocouple is available, the instrument is very versatile; meaning it can be used for many different kinds of temperature measurements. Descriptive bulletin 2146-C available.

Introduces Biggest New Product Program

THE Trane Company expects to launch the most extensive new product program in company history, D. C. Minard, president, announced recently. This new product program will provide about 25% of anticipated 1960 total sales volume for its full line of air conditioning, heating, ventilating and heat transfer products.

Leading the list of new products is the new Absorption Cold Generator which has just been introduced. The new absorption water chiller is completely hermetic. It has single-shell construction and completely automatic operation. The unit is factory assembled and wired to provide installation flexibility and lower costs. It is available in nine sizes from 100 to 350 tons.

A new Trane Reciprocating Cold Generator with a hermetic model of the Trane compressor is also available. Units are available in 11 sizes and range from 10 to 100 tons. The 10 ton units use R-12, others use R-22. All units are available with either pneumatic or electric controls. Control panels are factory wired. Compressor-chiller units are available with remote evaporative or air cooled condensers.

Trane is also introducing a hermetic compressor to meet the more rigorous demands of R-22. The unit has single-housing construction which minimizes alignment problems. The new Trane unit has an exclusive internal protector which avoids conditions that cause high motor temperature. It is available in capacities from 10 to 100 tons.

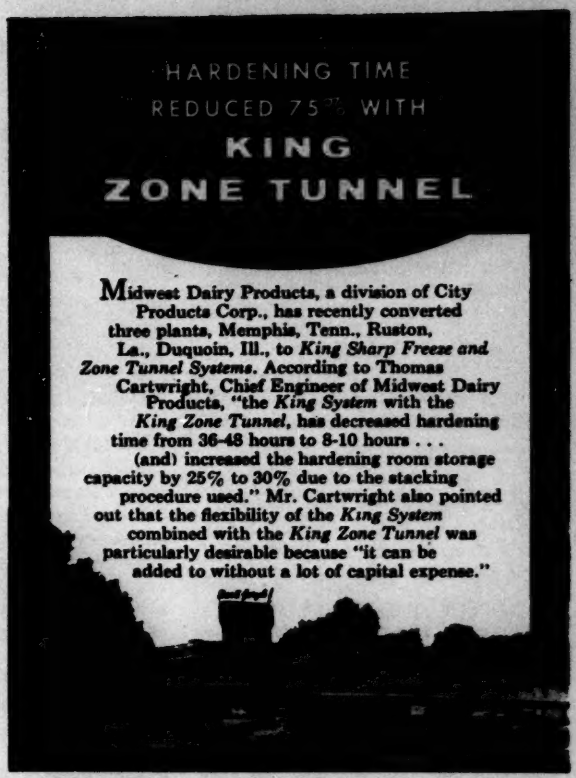
A new Trane Unit Ventilator is now available with air conditioning, as well as heating and ventilating. Refrigeration may be included when the unit is installed or added later. The units can be equipped so future cooling requires only the addition of a source of chilled water. The new units are only 11-5/8" deep providing extra, usable classroom area. Matching cabinets and shelving also are available.

Trane is also introducing complete new lines of heating and cooling coils. The new lines are more compact and are designed to minimize air bypass in addition to minimizing moisture carry-over on dehumidifying coils. A non-freeze type with one inch tubes provides optimum temperature distribution. Cast iron headers provide ruggedness and lower water pressure drop. The new cooling coil is completely drainable and cleanable.

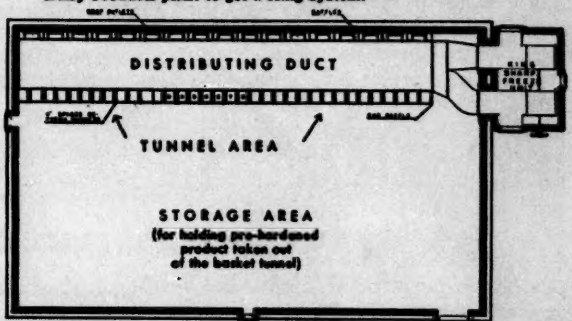
Trane is also introducing a new coil selection method that is more accurate than present methods. The selection method takes into account the effect of fin efficiency and surface temperature for wetted surface conditions, and provision for mass heat transfer factor under wetted surface conditions, plus heat transfer potential based on wet bulb temperatures.

New Trane Central Station Air Conditioners offer more sizes and more combinations for quicker, less costly solutions to a wider variety of applications. Draw thru and Blow thru types including Multi-Zone models are available in low and medium pressure types in capacities from 1,200 to 47,000 cfm. Dimensions have been reduced to offer more compact units. Improved damper design eliminates stratification. Opposed blade face dampers provide better control. Multi-Zone units provide independent, variable controls for as many as 14 zones. The damper section permits maximum flexibility in zone selection.

A compact heat pump in sizes from three to 15 tons is also now available from Trane. This new water-to-air heat pump has pre-wired controls, and easily accessible water piping and connections. Fans can be rotated in the field to change air discharge direction.


HARDENING TIME
REDUCED 75% WITH
KING
ZONE TUNNEL
Midwest Dairy Products, a division of City Products Corp., has recently converted three plants, Memphis, Tenn., Ruston, La., Duquoin, Ill., to King Sharp Freeze and Zone Tunnel Systems. According to Thomas Cartwright, Chief Engineer of Midwest Dairy Products, "the King System with the King Zone Tunnel, has decreased hardening time from 36-48 hours to 8-10 hours . . . (and) increased the hardening room storage capacity by 25% to 30% due to the stacking procedure used." Mr. Cartwright also pointed out that the flexibility of the King System combined with the King Zone Tunnel was particularly desirable because "it can be added to without a lot of capital expense."

This Fortune Ice Cream plant in Memphis was the first Midwest Dairy Products plant to get a King System.



Typical plan of combination hardening room and storage area with *King Zone Tunnel System.*

Section view of *King Zone Tunnel* showing basket stacking arrangement. *Air Blast* through product produces rapid hardening and improved quality.

Write for detailed technical bulletin.
50 years experience is at your service.

King COMPANY OF OWATONNA
907 North Cedar Street • Owatonna, Minnesota

Continued from Page 25

process but is speeded up by dirt, sludge and oxides that may be in the refrigerant stream. Whenever these become eroded through the foregoing or age the result is:

1. Liquid flood back
2. Very low superheat or none at all
3. Excessive valve "hunting".

With all due respects to the manufacturers of heat exchanger products, more failures to equipment have resulted from neglect of these components than from any other source. The usual end result of this neglect is a compressor failure. It is the only moving part within the system and from the immediate foregoing I hope you can visualize and believe the statement made in the previous portion, where it was stated that any system discrepancy is readily reflected back to the compressor and it suffers very severely from these unless they are immediately corrected.

Preventative maintenance, if it is planned and conscientiously carried out by those concerned, can prevent expensive breakdowns, loss of production time and loss of product, but here again the training of personnel is of prime importance and should be part of this program. Time does not permit me to go into all the details of procedures, programs, etc., for this usually has to be planned around the type of equipment and type of system involved. In closing then may I suggest that a program be developed which will include:

1. Personnel training in the arts and sciences of refrigeration service along with the manufacturers training concerning the end product.
2. Properly and conscientiously kept records of tests, repairs, etc.
3. Proper tools and essential parts.

In keeping with the job at hand the repairman should thoroughly check and correct any system discrepancy immediately for to do so means extra savings and trouble free operation of the system in general which is the goal we are striving to reach through this preventative maintenance program.

Army Builds Moblie Test Chamber

>>> THE Army's new "Thermobile", a mobile chamber designed and built by Lockheed Aircraft Corporation to precondition solid propellent missiles, achieves vital temperature control through Dunham-Bush compressors, evaporator coil, air cooled condenser, heat interchangers, receivers and evaporative-condenser.

Large enough to accommodate a 28-foot missile, the "Thermobile" can drop the temperature to 50 degrees below zero for a rocket motor stored inside, while the outside temperature is a torrid 110 degrees. On the other hand, it can raise the temperature of a rocket motor to 150 degrees, while the outside temperature is 10 below zero. Thus, the test missile can be calibrated so missiles can be used more accurately in temperatures ranging from Arctic to Equator.

The refrigeration equipment in the "Thermobile" occupies the area of the trailer directly behind the cab. This compartment is insulated from the conditioned area.

The system is of the cascade type and uses R-12 and R-22. 2 Brunner R5002 compressors and 1 EF 500 M5 (5 hp), and 1 E750M5 (7-1/2-hp) compressor units are the integral parts of the lowside equipment.

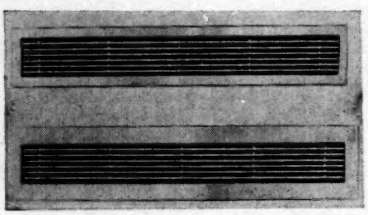
A Heat-X inner-fin chiller is used in the evaporator-condenser portion. A BC 1000 (10 ton) air cooled blower condenser is mounted in the machine compartment.

Heat-X heavy duty heat interchangers and 'OSM' oil separator-mufflers are used in the system.

Shafts extend from the machine compartment through the insulated wall into the conditioned area where they drive the fans in the special evaporator coils. Electric heaters are used for defrosting the finned coil and also as the heat source when the system is run on the heat cycle.

"Curtainaire" Grille

THE "Curtainaire," an extruded aluminum grille for supply or return installations, is being added to the Carnes Corporation's broad line of



air distribution products. This aluminum grille is available in widths from 1½" to 15" and in lengths up to 12 feet in one piece. The bars are obtainable in 0° or 15° settings and are spaced so as to be pencilproof. Two frame widths are standard, with friction springs for floor or sill installation, or safety catches for wall or ceiling installations. Accessories for this grille are opposed blade damper, straightening vanes and blanking baffles.

ARI Annual Meeting To Be Held In Florida

>>> AIR-CONDITIONING and Refrigeration Institute will hold its 1960 Annual Meeting at the Hollywood Beach, Fla., Hotel November 18 through 22, it was announced this week by Rudy Berg, president of the trade association of the air-conditioning and commercial and industrial refrigeration industry.

The Hollywood Beach session will be the first ARI Annual Meeting since its members voted to change the Institute's fiscal year to coincide with the calendar year. Previously the meetings had been held in May.

Mr. Berg also announced that the ARI Board of Directors will meet May 2 and 3 at the Homestead, Hot Springs, Va.

Unitary Air-Conditioners Published First 1960 Directory of Certified

»»» KEYNOTING completion of the first year's operation of the ARI Unitary Air-Conditioner Certification Program, and the beginning of the second, the Air-Conditioning and Refrigeration Institute has issued the first 1960 Directory of Certified Unitary Air-Conditioners, in which some 1995 models of about fifty participating manufacturers are listed.

The Directory is being distributed, as were its predecessors in 1959, to dealers and contractors throughout the country, to architects and consulting engineers, to government personnel concerned with air-conditioning at national, state, and local levels, and is available to the public through the dealer and contractor outlets of the participating manufacturers who represent more than 90 per cent of total U. S. production of unitary air-conditioning equipment. The Directory also will be available through Better Business Bureaus throughout the country, as well as through ARI headquarters in Washington.

The program of which this Directory is an integral part, is based on firm, enforceable contracts between participants and ARI, under which the seal of certification may be withdrawn if equipment does not meet the claimed ratings. It is not a "voluntary" program, once a contract to participate has been signed.

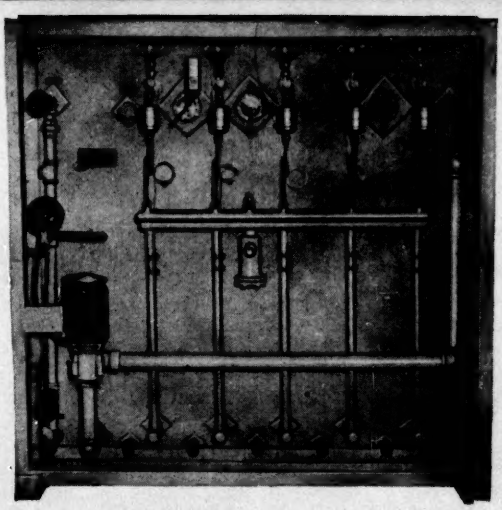
During 1959, the "shakedown" year of the program, it has proven very successful, according to Geo. S. Jones, Jr., managing director of ARI, and a pattern for the routine random testing of units has been established by the Institute, under which at least four units will be tested every month to determine whether their rated capacities are met by the stock units themselves. As a result of this success, a number of manufacturers who did not participate in 1959 have signed contracts as participants in 1960.

Under the random testing procedure (no manufacturer knows when or what model of his output will be subjected to test), the ARI feels that it is certain to keep "tab" on all participating producers. In addition to the random testing procedure, competing manufacturers may test the products of any competitor, and if it is found wanting in Btu output, as against its published claims, may report to ARI, which will make tests through its private testing laboratory, and here again the privilege of using the seal may be withdrawn if products do not meet the rigid tests and their manufacturers do not make suitable adjustments to make them conform to published ratings.

While the program at this time covers only unitary air-conditioners up to 135,000 Btu per hour capacity, it is expected that heat pumps within the same range may be included in it sometime this year or early in 1961, according to ARI officials who added:

"This program is designed to provide enforcement authority to the applicable ARI Standards. We feel that it is an aid to contractors, distributors, architects, dealers, and all purchasers of unitary air-conditioning. It gives them the assurance that the equipment they are specifying or buying will meet the requirements it claims to meet. We believe that this program offers proof of our industry's 'coming of age,' and we believe that it will eliminate unrealistic claims upon which the purchaser has, at times in the past, been unable to make necessary comparisons."

STEP AHEAD with "King Zeero's" NEW Combination PURE WATER COOLER and ICE BUILDER



Front View of PURE WATER COOLER (P.W.C.) installed at Salerno-Megowen's large new baking plant at Niles, Illinois.

For INGREDIENT and WASH WATER APPLICATIONS

Provides a Clear Odorless, Palatable, Cold Water Supply

Equipped with self-contained activated carbon filter, which removes silt, algae and chlorine from city or well water supply. Cools water to 34 degrees Fahrenheit. Pure water is chilled by ice water - prevents freeze-ups. The ideal water for food processing needs, butter or cheese wash, dough water, poultry or produce chilling, or any application where good, cold, clean water is required. Can be connected to present refrigerating machines using ammonia, freon, or methyl-chloride.

The Ice Builder side of the unit may be connected to secondary equipment designed for ice water cooling such as milk coolers, tanks, dough mixers, or air conditioning equipment.

Write for Bulletin PWC 59.

THE KING ZEERO COMPANY 4300-14 W. Montrose Ave Chicago 41, Ill.

Manufacturers of Ice Builders - Ice Builder Cabinets - Ice Banks - Pure Water Coolers

NARW Will Hold Separate 1961 Convention

››› THE National Association of Refrigerated Warehouses will hold its 1961 annual meeting separately from the Merchandise Division of the American Warehousemen's Association, according to an announcement by NARW President W. C. Baker. The decision was prompted by a majority vote of the NARW membership, in a special referendum, favoring a separate meeting on a one year trial.

NARW's 1961 convention will be held in San Francisco with headquarters in the Mark Hopkins Hotel, March 27 through March 30. Immediately following this separate convention another referendum will be conducted on the question of continuing separate NARW Conventions or resuming joint meetings with the AWA Merchandise Division.

Reasons given by some of those who voted for a separate Convention included: (1) a belief that greater flexibility in the choice of convention dates and sites would result; (2) that it would afford a better integration of The Refrigeration Research Foundation meetings with NARW meetings enabling more members to attend both; (3) that the holding of smaller, more intimate meetings would facilitate greater exchange of ideas and information at both the social and business functions.

NARW President Baker emphasized that this development affects only the 1961 Convention plans and that NARW will continue as a Division of the American Warehousemen's Association, maintaining close liaison with the AWA Merchandise Divsion.

NARW will hold its 1960 Convention in conjunction with the AWA Merchandise Division as in previous years. This meeting will be held April 25-28 at the Americana Hotel, Bal Harbour, Fla.

Air Conditioning Vital In Fire Center

››› THE new St. Louis Fire Alarm Center, when activated next year, will intercept all fire alarms turned in from the city of St. Louis. Each alarm, whether received by phone or by fire alarm boxes, will then be promptly re-transmitted from the Center to the proper fire station. 1172 miles of underground telephone and telegraph circuits link all fire stations to the Center, enabling quicker response to all fire reports.

As a safety precaution, the Center is located almost entirely underground. Eighteen inches of earth covers a 12 inch thick reinforced concrete roof. Only a southern wall is exposed and this would be barricaded in time of crisis.

Because the Fire Alarm Center is located underground, air conditioning is vitally important. Thirty tons of air conditioning equipment was supplied by Curtis Manufacturing Company to perform the important task of supplying cool clean air throughout the Center. This insures ideal working conditions for personnel and proper functioning of all equipment. The air conditioning system re-circulates inside air or draws it from the outside of the building, depending on outside temperatures. Should the outside air become contaminated by dust or smoke resulting from an atomic explosion or other disaster, the air filter is automatically changed. This provides a constant source of filtered air.

Two Curtis air compressors are also utilized in this installation. One air compressor is used to pressurize cable containing the 1172 miles of underground telephone and telegraph circuits, insuring protection from water seepage and foreign matter intrusion in the event of a mechanical break. This maintained pressure also serves to activate an automatic alarm and "spotting" system if such a break occurs. The second Curtis air compressor is a standby for this underground pressurizing, and also supplies pressure for eight cleaning jets, built into the various parts of the building to provide the maximum cleanliness which this center requires.

M. C. Pollock Chairman of Food Packers Meeting

››› M. CRAWFORD POLLOCK, director of marketing development, Campbell Soup Co., Camden, N. J., will serve as chairman of the 19th Annual Convention of the National Association of Frozen Food Packers.

This was announced by Lawrence S. Martin, secretary-manager of NAFFP. The convention will be held March 6-10, 1960 at the Conrad Hilton Hotel in Chicago in conjunction with the Frozen Food Exposition also held annually by NAFFP.

Pollock is responsible for the Long-range planning of marketing programs aimed at creating optimum development of his company's business. He was appointed to this post in April of this year (1959) after four years with Campbell.

Martin said Pollock's choice as head of the committee planning the packers' convention points up the emphasis that will be placed during the general sessions on the development of ideas that will lead to greater sales.

"Frozen food packers are both manufacturers and salesmen," Martin said. "Neither role is complete without the other. The Committee planning this year's convention is working to strike a balance on the program which will help our members with future problems in either area."

Pollock said his committee has scheduled specialized technical group discussions covering such areas as transportation, warehousing, and bacteria controls. But he said the three general sessions would be devoted to current and future challenges in getting quality products on the tables.

Previously, Pollock was a director and vice president of the Campbell Swanson Distributing Company. He had been product Manager-Frozen Foods, a position to which he was appointed upon joining the company when C. A. Swanson & Sons became affiliated with Campbell.

At Swanson, Pollock was a vice president and responsible for all sales and advertising. He was identified with the introduction of Swanson's frozen poultry, canned products, meat pies and "TV" brand dinners.

New Books On Refrigeration Applications and Processing

Standard Plant Operators Questions and Answers, 1959

—By Stephen M. Elonka and Joseph F. Robinson. McGraw-Hill Book Co., two volumes, 518 pages, $14.95 or $8.00 per volume.

These volumes cover a license examination course for plant, refrigeration, steam, diesel, nuclear, electrical and building engineers. In "question and answer" format, this work is intended to provide information on every phase of operating and maintaining industrial, utility and building power services to aid the reader in the preparation for any American or Canadian license examination involving boilers, steam engines, steam turbines, pumps, instruments, electricity, vacuum tubes, refrigeration, diesel equipment, air conditioning, fuels and firing, compressed air, heat exchangers, gas turbines, cooling towers, building heating, lubrication, etc.

Mechanical Refrigeration 2nd Edition, 1959

—Norman R. Sparks and Charles C. Dillis. McGraw-Hill Book Co., 284 pages. $8.00.

In the revision of this edition, the authors have added to the original text including a chapter on compressors covering the basic theory of centrifugal compressors to give the student a better understanding of the limitation imposed on refrigeration systems by the compressor. As air cooling systems have become a necessity in high speed aircraft, the text on the air refrigeration cycle has been revised to meet this development.

In this revision, chapters on air conditioning and heat pumps have been expanded considerably. Material has been included on vapor compression with the various multistage compression arrangements, solid carbon dioxide systems, multiple evaporator systems, absorption refrigeration systems and steam jet-chilled water systems.

Thermodynamics, 1959

—By Gordon J. Van Wylen, John Wiley & Sons, 568 pages. $7.95.

The author has prepared this text for undergraduate work combining three features; namely, an approach directed toward students, a rigorous treatment of fundamentals and a distinctively engineering perspective. The sixteen chapters consider: Some Descriptive Considerations—Definitions—Properties of a Pure Substance—Work and Heat—The First Law of Thermodynamics—Second Law of Thermodynamics—Entropy—Ideal Gases—Mixtures Involving Ideal Gases—Availability, Irreversibility, and Efficiency—Reciprocating Machines—Power and Refrigeration Cycles—Flow Through Nozzles and Blade Passages—Thermodynamic Relation, Equations of State, and Generalized Charts—Chemical Reactions; Combustion—Equilibrium.

Potato Processing, 1959

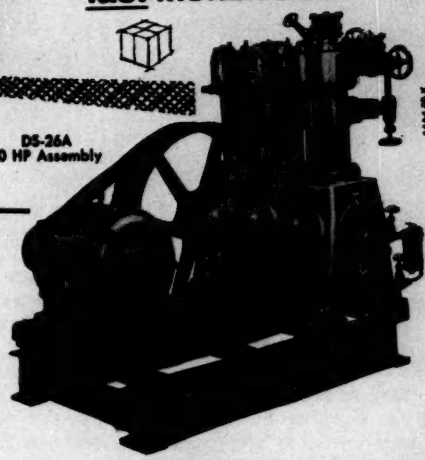
—William F. Talburt and Ora Smith. Avi Publishing Co., 476 pages. $9.50.

According to the authors about one-fifth of all potatoes for food use are now frozen, dehydrated or canned and authorities expect that within a few years this amount will increase to about one-half.

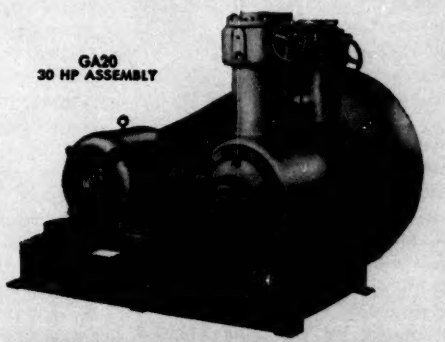
In the chapter devoted to frozen potato products, the authors discuss present and future market potentials, processing, storage, frying, cooling, freezing and packaging, standards, quality control, co-products, etc.

In preparing the book, the authors have given special attention to processing procedures, equipment and problems encountered in all types of potato processing so as to make it a reference book for those directly engaged in any type of potato processing.

HOWE
COMPRESSOR
"PACKAGES"
assure
fast installation!



Factory-assembled with compressor, drive and motor on a steel base, HOWE'S compressor "package" can be completely installed in a matter of hours. In both standard and booster models with capacities to 60 H.P., these new HOWE assemblies sharply cut installation costs. They save time and space, and eliminate need for special foundations and expensive belt guards. World-famous Howe Compressor qualities, with medium speed and long life, are now built into complete, compact assemblies. The know-how gained from nearly fifty years of refrigeration equipment manufacturing assures maximum efficiency at the lowest possible cost. Consult Howe today!
Write for literature



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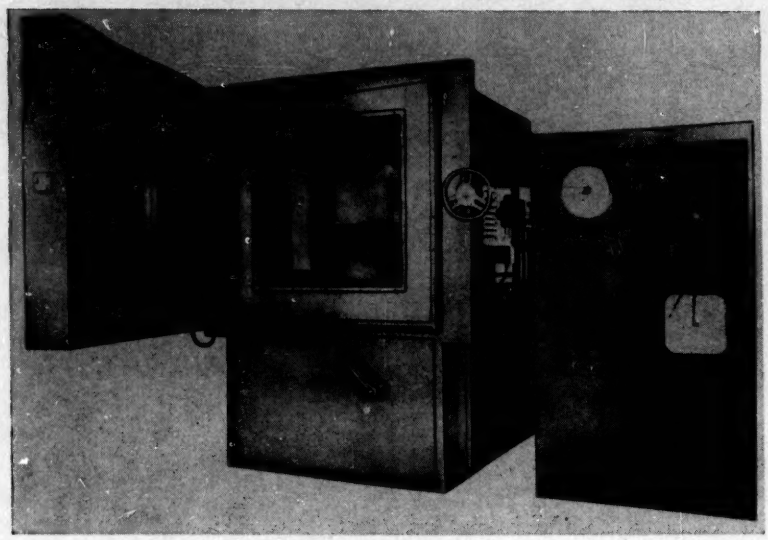
Test Cabinet Has Wide Temperature Range



»» THE American Research Corporation, Farmington, Conn., has just completed delivery to a leading missile manufacturer of an unusual environmental test facility designed specially to simulate missile take-offs.

Within the chamber the temperature can be lowered to minus 80°F and then raised at the rate of 150°F per minute to as high as 800°F. Rapid increases in temperature can also be obtained at high altitudes.

This unusual combination low temperature cabinet and oven also provides altitude simulation up to 100,000 ft.

A special feature of the facility is the design of the view window which makes it possible to observe the test specimen throughout the wide temperature range.

The cabinet has a test area of 3' x 3' x 3' and is instrumented for complete programming.

CRMA Good For Industry, Allen Declares

»» ONE of the greatest trade associations in the country and one giving immeasurable value to the refrigeration industry (and to the food industry) is the Commercial Refrigerator Manufacturers Association, Mark Allen, president of the association, declared.

Mark Allen

Allen, who just returned from the CRMA Chicago meeting, is Secretary-Treasurer of the Weber Showcase & Fixture Co., Inc., of Los Angeles.

"As shown by the December 4 meeting in Chicago," Allen said, "it benefits everyone concerned to participate in an organization like this one where the industry problems, advances, and trends are discussed."

Some of the subjects discussed at the CRMA meeting were present sales, future sales, cost control, labor, financing and credit, distribution problems, and frozen food handling codes.

Most of the members reported a larger backlog of orders than in previous years, Allen said. Regarding financing, he said:

"We don't have to apologize to our customers for the high cost of financing. It is the same for everyone and is one of the inescapable costs of doing business."

Interest rates cannot be expected to go down for at least a year or two, he said. He also called attention to the fact that much steel is coming in from Europe and Japan, which will dampen the effect of any price adjustment theories being entertained by domestic producers.

It was the consensus of opinion at the meeting, Allen declared, that refrigeration equipment now being manufactured is fully capable of meeting accepted requirements in the handling of frozen foods. The member manufacturers of the association are continuing, as they always have, to work with all segments of the food industry toward improving the standards for all types of perishable foods.

World Fish Catch Registers Three-Million-Ton Increase

»» THE world total commercial fish catch last year registered a three-million-ton increase over that of 1957, according to the Yearbook of Fishery Statistics released by the Food and Agriculture Organization. Japan, with a catch of 5.5 million tons, continued to be the largest producer of sea fish.

The Yearbook, published jointly with a yearbook on statistics on international trade in fish, covers the catch of fish from 1953 to 1958. The total 1958 catch was 33.7 million tons live weight, almost 13 million tons above the single years of 1938 and 1948, just before and after the Second World War. Russia reported the highest catch in her history, at 2.6 million tons.

The 1958 total includes a rough estimate of six million tons for production of sea and fresh water fish by Mainland China. This figure has been released by the government of that country and represents a 100-percent increase over its reported catch in 1957.

Asia had 50 percent of the world total catch, with Japan contributing 17.2 percent of the Asian total. European fishermen, excluding these from Russia, caught more than 22 percent, and North Americans 10 percent.

The U.S.S.R. reported catches amounting to more than eight percent of the world total. Africa contributed five percent, an outstanding increase over last year's figure.

Insulation Contractors Hold Fourth Meeting

»» THE Southwest Insulation Contractors Association held its fourth semi-annual meeting in October at Dallas, Texas. Its members include distributor-contractors of industrial insulation within the seven state area of Texas, Oklahoma, New Mexico, Louisiana, Alabama, Mississippi and Arkansas. Principal industries served are oil refining, chemicals, power plants, paper, cold storage and air conditioning.

Elected as officers were E. J. Stern, Dallas, Texas, president; Roy Coffer, Mobile, Alabama, vice-president; Frank M. Taylor, Shreveport, La., secretary-treasurer, and directors as follows: Granville Drowns, Houston, Texas; N. W. Bailey, Little Rock, Ark.; M. G. Steinmeyer, Tulsa, Oklahoma; H. M. Aber, Houston, Texas; Homer C. Porter, Jackson, Mississippi; W. J. Childress, New Orleans, La.; M. R. McCarty, Baton Rouge, La.; Ray W. Thomas, Albuquerque, N. M., and B. J. Barnhart, Austin, Texas.

Industry Meetings

Practical Refrigeration — **Feb. 26, 27**
PACIFIC COAST CONFERENCE, NAPRE
CALIFORNIA CHAPTER NO. 2
Los Angeles, Calif.

Frozen Food Packing — **Mar. 6-10**
NATIONAL ASSOCIATION OF FROZEN FOOD PACKERS
Conrad Hilton Hotel, Chicago, Ill.

Symposium — **March 18, 19**
THE REFRIGERATION RESEARCH FOUNDATION
On Package Environment in Refrigerated Warehouses
LaSalle Hotel, Chicago

Power Forum — **Mar. 29-31**
ILLINOIS INSTITUTE OF TECHNOLOGY
22nd Annual American Power Conference
Hotel Sherman, Chicago

Warehousemen — **April 25-28**
NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES, INC.
American Hotel, Bal Harbour, Florida

Air Conditioning Conference — **Apr. 27-30**
WESTERN AIR CONDITIONING INDUSTRIES ASSN.
Shrine Exposition Hall, Los Angeles

Meat Packing — **May 12-15**
NATIONAL INDEPENDENT MEAT PACKERS ASS'N.
Ambassador Hotel, Atlantic City

Air Conditioning and Refrigeration Institute — **May 1-4**
BOARD AND ANNUAL MEETING
The Homestead, Hot Springs, Va.

Cryogenics — **August 23, 24, 25**
CRYOGENIC ENGINEERING CONFERENCE
Sponsored by University of Colorado
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Dairy Show — **Oct. 31 to Nov. 5**
22ND DAIRY INDUSTRIES EXPOSITION
With 8 Dairy Industry Organizations
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Dunham-Bush Opens Aero-Electronic Cooling Equipment Facility

To better serve the increasing needs of customers for aero-electronic cooling equipment, Dunham-Bush, Inc. announced recently the establishment of a separate facility in West Hartford, Connecticut. Located on Shields Street, a short distance from the main plant, the entire production capacity of this new plant will be devoted to specialized heat transfer units. E. A. Carell, product manager, heads up this special department.

York Realigns Sales Force

»» A REALIGNMENT of responsibility within the engineered machinery sales department of the York Division of Borg-Warner Corporation has been announced by C. J. Schurman, general sales manager.

Under the new delegation of responsibility, F. C. Wood has been promoted from mid-western manager to manager, air conditioning sales. W. H. Divine, manager, refrigeration sales, and W. S. Miller, manager, marine sales, retain the same titles, but assume new authority over an expanded regional and divisional sales force.

Schurman said that the change is part of York's policy of promoting within the organization wherever possible to meet the needs of growing markets. "This new vertical alignment will permit our sales managers to concentrate more closely on the equipment and markets under their supervision," he said.

Schurman pointed out that industry sales of engineered machinery are growing rapidly. "With the market for this equipment less than 10 per cent saturated, we foresee a doubling and tripling of our sales within the next few years."

Working directly under the sales managers will be seven regional managers, each responsible for a specific geographic section of the country. These are:

E. J. Berlet—North Atlantic Region
T. Y. Davis—Middle Atlantic Region
W. W. Salmond—Southeast Region
R. A. Johnson—East Central Region
R. E. Miller—Central Region
G. C. Briley—Southwest Region
C. P. Strickland—Pacific Region

The appointment of J. V. Clippinger as manager, parts and accessory sales, was also announced. Clippinger has been associated with the York Parts Depot program from its inception. He will now be responsible for administration of the program and for integrating its activities wth the company's other sales objectives.

Illinois Ice Plant Boosts Production

»» CONTINUING a policy of expansion that has converted the Glenn Ice and Fuel Company plant into one of the most modern of its kind in the nation, John H. Glenn, president of the Corporation, has announced a program of automation that will increase ice manufacturing capacity and ice cube storage facilities by nearly twenty-five percent.

The ice plant, located on the banks of the Illinois River at the historic site where Abraham Lincoln was named a Captain during the Black Hawk wars, will soon be provided with more new equipment for the production of almost 100 tons of ice daily.

Compressors of the latest type are to be installed so that the newest methods of automation in ice production may be utilized for more efficient and economical operation. Additional ice cube storage facilities, automatic bagging, closing and weighing machines, plus power conveyors are to be provided. John H. Glenn is now arranging to receive bids for these new installations.

Production and sale of ice has grown here into a major industry, "a far cry from the old days" when it was "harvested" during the winter months from the Muscooten Bay and stored in sawdust for use during the summer.

Extent of the service is indicated by the Glenn accounts including railroad companies, meat packers, dairies, poultry processors, fish markets, bakeries and dozens of other diversified industries.

Arden Ice Cream Plant Sold to Kunin Frozen Foods

»» THE acquisition of the Arden Farms Ice Cream plant, located 161 W. Jefferson Ave., in Los Angeles, by Kunin & Sons, Los Angeles, frozen food distributors and meat packing firm, is announced by Aaron Rappaport, treasurer of the firm.

Containing over 15,000 sq. ft. in freezing facilities, the former Arden plant, occupies a full acre of ground, and will be used by Kunin to expand its frozen food processing and meat packing activities. Possession will take place immediately.

Kunin & Sons, 30 year, Los Angeles, frozen food and meat packing firm, plan a year-long expansion program with emphasis on the marketing of a new consumer line of Kunin Frozen Vegetables and Kunin Supreme brand of meat. The companies' main offices are located at 115 W. Santa Barbara, in Los Angeles, with 13 branch offices, located in outlying areas.

Fram Aire Corporation Division of Fram

»» THE creation of a new organization known as Fram Aire Corporation, Division of Fram Corporation, has been announced by Steven B. Wilson, Fram board chairman. The change took effect January 1.

According to Wilson the new organization will permit more efficient

management of Fram's fast-growing line of germ-killing air filters for air conditioning and heating applications. Headquarters for the new company will adjoin Fram's World Headquarters in East Providence, R. I.

Fram germ-killing filters will make a strong appearance during the coming year because more than fifteen major original heating and cooling equipment makers have specified FRAM Aire filters for use in their 1960 lines. FRAM Aire also has many thousands of distributor and dealer outlets for its products in the replacement filter market. The new germ-killing air filters are finding many applications in homes, industry, hospitals, and military institutions.

New Brochure On Water Conditioning

››› JUST received from Stiles-Karlsonite Corporation, Waukegan, Illinois, is a new brochure on the treatment or conditioning of water with Karlsonite Phosphate Water Conditioner.

This water soluble, complex, nontoxic, crystalline phosphate suspends and inactivates elements that would prove harmful and damaging to domestic, commercial and industrial equipment.

Fed into the water line by the Stiles-Karlson Automatic Dispenser, this tasteless compound prevents the precipitation of calcium and magnesium salts in the water. It also forms inert complexes with certain metallic ions such as iron, copper, nickel, etc. and holds them in suspension and prevents harmful deposits and the corrosion, or pitting of metals in the water system.

Copies of this brochure may be obtained by writing Stiles-Karlsonite Corp., 1550 Grand Ave., Waukegan, Ill.

Nathan Kramer Dies

››› NATHAN Kramer, president of the Kramer Trenton Company, manufacturers of air conditioning and refrigeration equipment, died December 3 of a heart attack at his home, 1011 Buckingham Way, Morrisville, Pa. He was 71 years old.

Mr. Kramer had founded the Kramer Trenton Company in 1914. The plant is nationally known for the equipment it has made over the years and he had remained active in the firm right up to his sudden death. A civic leader for many years, Mr. Kramer had served on numerous boards and charitable organizations and was active in the annual fund-raising drives of the community.

The husband of the late Mrs. Lillian Kramer, he is survived by his son, Harold; a daughter, Mrs. Leonard Englander; a grandson, Michael Englander: two brothers Israel and Hyman; and two sisters, Mrs. Ethel Dolowitz and Mrs. Sarah Chaiken.

Superior Valve Catalog

››› SUPERIOR Valve & Fittings Company announces the publication of catalog R-7 for the refrigeration and air conditioning industries. The new catalog includes complete information on line valves, globe valves, relief valves, heat exchangers, check valves, SAE flare fittings and related brass products.

The 20-page catalog contains detail information on sizing and application of valves and components, with added data on working pressures and descriptions of the codes and regulations to which the products are manufactured.

Copies of catalog R-7 are available—write to Superior Valve & Fittings Company, 1509 West Liberty Ave., Pittsburgh 26, Pa.

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WAKEFIELD, MASS.

Link Belt Catalog

LINK-BELT Company's new line of highest capacity spherical roller bearings is described in complete detail in its comprehensive new 52-page Book No. 2760. The new Link-Belt spherical bearings combine three features: maximum diameter and quantity of convex rollers for each bearing size; precision machined centrifugally-cast bronze retainers and high, heavy inner race shoulders.

The profusely illustrated book describes all design features, including comprehensive selection data and formulae, shaft bearing seat diameters, lubrication information, shaft details and bearing load ratings, diagrams, photographs and charts.

A copy of Book 2760, "Spherical Roller Bearings and Pillow Blocks" may be obtained from Dept. PR, Link-Belt Company, Prudential Plaza, Chicago 1, Illinois.

New Bohn Technical Manual Available

>>> THE Bohn Aluminum and Brass Corporation has just produced a new manual on its line of coils for easy heating and cooling purpose. In addition to specifications, drawings and installation instructions, the manual includes direct selection tables for three types of steam coils, two types of booster coils, two types of water heating coils, three types of water cooling coils, and four types of direct expansion coils. Copies may be procured through the heating and cooling coil department, Bohn Aluminum and Brass Corporation, Danville Division, Danville, Illinois.

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Vilter Pittsburgh Office and District Manager

>>> THE Vilter Manufacturing Company, Milwaukee, Wisconsin manufacturer of commercial refrigeration and air Conditioning equipment, has announced the appointment of David N. McCormick as district manager of the firm's newly established Pittsburgh, Pennsylvania office. The office has been opended to better serve Vilter customers and distributors in western Pennsylvania and New York.

D. N. McCormick

McCormick joined Vilter in 1957 and has recently completed an extensive training program at the company's Milwaukee and Cincinnati offices.

He is an alumnus of Pennsylvania State University, graduating with a B.S. in industrial engineering, and is a member of the American Society of Heating, Refrigerating and Air Conditioning Engineers.

Davison Changes System In Industrial Chemical Sales

>>> TO achieve greater efficiency and closer control of Industrial Chemical sales, W. R. Grace & Co. Davison Chemical Division in this product classification is changing from a territorial to a product supervisor type of operation. Representatives who previously sold the diversified line of Davison industrial chemicals in a restricted area will have national responsibilities for single products or groups of closely related products.

In line with the policy, John J. Kunkowski has been appointed sales supervisor for fine-sized silicas, sold under the Davison "Syloid" trade name and offering numerous industrial uses, including flatting agents for varnishes, lacquers and other finishes. He will operate out of Baltimore headquarters and be charged with the development of existing business, as well as new applications for these products. He will coordinate and direct the efforts of distributors and coordinate the work of the technical service department in the product category.

C. Victor Bolles has been appointed sales supervisor for gas dehydration silica gels, operating out of the Davison office in Houston, Texas, with responsibility for continuing the development and expansion of sales of silica gel in natural gas and hydrocarbon recovery processes. He will also coordinate technical service in the product category.

Mr. Kunkowski, who came to Davison in 1952 after experience with Montgomery, Ward & Co. and The Martin Co., has been field service engineer with headquarters in the Davison office in Chicago. He previously was in technical service.

Mr. Bolles also joined Davison in 1952, coming from American Cyanamid Co., and has been successively field service engineer at Lake Charles, La., and Houston.

Both men will operate under David P. Barrett, Industrial Chemicals sales manager.

High Pressure Air Cooling For Seven Ships

>>> HI-PRESS Air Conditioning of America, Inc., has booked orders for the installation of its air-conditioning systems on seven of the combination cargo-passenger ships now on order in United States shipyards for the Moore-McCormack Lines, S. W. Brown, president of Hi-Press, reports.

The new vessels, especially designed for Moore-McCormack, will approximate 11,000 tons each and will have deluxe accommodations for 12 passengers each. All staterooms, quarters for officers and crew, and public spaces will be air conditioned with Hi-Press equipment.

Two of the ships will be constructed in the San Pedro, California yard of Todd Shipyards, and five will be built at the Chester, Pennsylvania yard of Sun Shipbuilding and Dry Dock Company. The new fast cargo-passenger ships are part of an extensive ship replacement program undertaken by Moore-McCormack Lines.

The Hi-Press system employs small diameter piping, instead of conventional ductwork, for the high velocity distribution of conditioned air in a relatively draftless and noiseless manner. It is designed to effect substantial savings in initial installation and maintenance, compared with conventional systems.

Romito Directs Allied Chemical Production

»» APPOINTMENT of Virgil A. Romito as director of production of Allied Chemical's General Chemical Division has been announced by J. Steele Brown, vice president.

Until his appointment last year as maintenance manager, Mr. Romito had been plant manager of the division's largest producing facility, Delaware Works at North Claymont, Delaware, for five years.

He joined the firm in 1933 as a draftsman, later serving in a wide range of production, engineering and maintenance posts at plants in Newell, Pennsylvania; Chicago, Illinois; Camden, New Jersey; Edgewater, N. J., and at the General Chemical Defense Corporation plant operated for the War Department during World War II at Point Pleasant, West Virginia.

Mr. Romito is an alumnus of Carnegie Institute of Technology where he received a BS degree in mechanical engineering in 1932. While a student at Monessen High School, Monessen, Pa., Mr. Romito also worked for the company during summer vacations at its Newell, Pa., Works.

Bulletin On New Drip-Proof Motors

STERLING Electric Motors, Inc., announces availability of a bulletin, No. 196, on the newly developed "Sterlicone Multi-Shielded" drip-proof motors introduced recently by the company.

The bulletin illustrates the five outstanding design features, and explains in detail how these motors can replace totally-enclosed motors in many applications where adverse conditions of moisture, humidity, dust, oil and chemicals prevail.

Copies of Bulletin No. 196 are available on request from Sterling Electric Motors, Inc., 5401 Telegraph Road, Los Angeles 22, California. 4 Pages.

Baltimore Aircoil Appointments

»» SWEIGER-DAVIDSON Company has been appointed Chicago representative for Baltimore Aircoil Company, Inc. Territory includes the Chicago trading area.

A. C. Dean Company is now exclusive representative for B.A.C. in Miami and southeast Florida.

Richard K. Peck, Jr. represents B.A.C. in Tampa, Jacksonville and surrounding counties of Florida.

James F. Hayes is now associated with James R. McQuaide, the new exclusive representative for B.A.C. in eastern Pennsylvania and southern New Jersey.

Thomas B. Gilliam Company of Dallas is the new refrigeration representative for B.A.C. in northern Texas, northern Louisiana and Oklahoma. J. P. Aschraft Company will continue to represent Baltimore Aircoil in air conditioning equipment.

Leak Testing Of Tanks, Piping And Other Enclosures

BULLETIN GET-2936, six pages, gives detailed instructions on use of halogen leak detectors for finding leaks in enclosures that can be pressurized. Applications discussed include aircraft and missile fuel and hydraulic systems, dairy equipment, steam boilers, valves, piping, transformers, air-conditioning and refrigeration equipment, and others. Includes discussion of system preparation, testing procedures, quantitative measurement techniques, and calibration. General Electric Company, Schenectady 5, New York.

Classified Advertising

Position and Help Wanted

REFRIGERATION SALES ENGINEER

Rapidly expanding, well established West Coast industrial refrigeration manufacturer has excellent opportunity for aggressive sales engineer. Must have engineering degree or equivalent; minimum of three years refrigeration sales engineering experience in quick freezing, cold storage and process refrigeration. Most important, must be aware of dynamic potential of the industrial refrigeration industry.

Excellent salary and commission; outstanding company benefits; car allowance and expenses. Send detailed resume to C. R. Kohlenberger, president.

KOHLENBERGER ENGINEERING CORPORATION
1600 W. Commonwealth Ave. P.O. Box 432
Fullerton, Calif.

Plant For Sale

FOR SALE — Ice manufacturing, locker and cold storage plant, supplying Cape Cod. 102,000 cu. ft. cold storage space (26,000 cu. ft. in lockers, 64,000 cu. ft. in general storage — ten year lease 12,000 cu. ft. to Harwich Frozen Foods). 45 ton ice plant; 15 refrigerated outside ice dispensing stations; 4 ice venders; ice processing and bagging department fully equipped for easy handling. Write Mrs. William Lee, Red River Associates, South Harwich, Mass.

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Use QUICKSEAL—stops brine tank leaks.
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FOR SALE — at former Duffy Silk Mill, Buffalo, N.Y., Worthington Model ECZ-501, 40 ton exaporative condenser, 2 yrs old; Carrier 7½ h.p. 440 volt self-contained methyl-cholride compressor; 1 Carrier 15 h.p. same as above; 1 Worthington 25 h.p. compressor, 220/440, 60 cycle, 3 phase, self-contained; 1 Worthington 20 h.p. compressor, 220/440 etc., same as above; 2 Worthington Y Model methyl-chloride compressors, 60 h.p. each, self-contained; misc. other equipment. Free listing or inspect in Buffalo; communicate with exclusive sales agents, Chas. S. Jacobowitz Corp., 3080 Main St., Buffalo 14, N.Y. Phone AMherst 2100.

WANTED IMMEDIATELY — Evaporative condenser, approx. 40-60 ton, can possibly use two units if you will tell us the manufacturers' names and age and condition of equipment you have, together with your asking price F.O.B. truck, shipping point; dealers invited. This is urgent and sincere inquiry. Write Box FB-5, % Industrial Refrigeration.

FOR SALE
(2) 11x9 York compressors 60 h.p. each.
10x10 & 9x9 York compressors V-belt drive.
7½x7½ York & 7x7 Frick compressors.
25 ton Diesel operated ice making plant.
Type 100 F & E automatic ice cuber.
25 h.p. & 10 h.p. air compressors.
JOHN F. CARSON
A & Venango Sts. Philadelphia 34, Pa.
GArfield 6-2221

FOR SALE — 4 Vilter 10x10 compressors, late model, with synchronous motors, erected in closed food processing plant; buy one or all; write for complete details immediately, air mail to Box FB-3, % Industrial Refrigeration.

FOR SALE — York 7½x7½, York 8x8 Model D6, York 9x9 Model D6 compressors, complete with AC motors and starters; ammonia receivers, shell and tube condensers, Uline type 3 ice cuber, Carrier self-contained methyl-chloride compressors; individual room coolers or diffusers; thousands of feet of galvanized ammonia pipe. Write for free listing. Dept IR, 3030 Main St., Buffalo 14, N. York. Phone AMherst 2100.

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3—15 ton complete Frick ice making plants, new, in crates, no air system, sold as used.
2—10"x10" 4 cyl. Carbondale duplex DC to 225 h.p. 300 r.p.m.
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1—10"x10" 2 cyl. York DC to 125 h.p. motor.
1—9"x9" 2 cyl. Frick compressor.
1—6½"x6½" 2 cyl. York compressor.
1—8"x8", 1—6"x4", 2—5"x5" condensing units.
3x3", 4x4", 5x5", 6x6" compressors.
11x22x51" 300 lb. ice cans, also 11x22x47" ice plants, 25 to 100 ton capacity, complete.
10 shell & tube condensers, 25 ton capacity.
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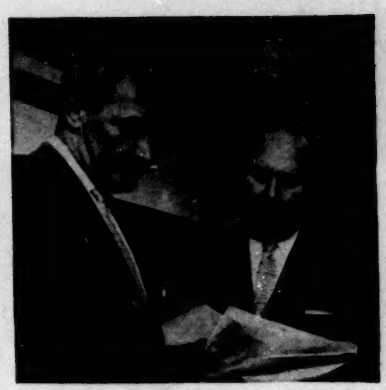
Baltimore, Maryland, service engineer reports: "'Freon' refrigerants help us do a better servicing job. It's dry and safe—the most dependable refrigerant on the market today."



East Rockaway, New York, contractor reports: "Nothing works like 'Freon'. I'm convinced it's the best refrigerant on the market—safe and dependable for any job."

Louisville, Kentucky, service man reports: "'Freon' is the world's best refrigerant for our money. It's pure, dry and safe—never causes one bit of worry or trouble."

Atlanta, Georgia, contractor reports: "We've never had a bad batch of 'Freon' in the 25 years we've used it. It's never caused us trouble on the job or—after years of service—in a system."

Tucson, Arizona, service man reports: "'Freon' refrigerants help us do the best job possible. They're reliable and safe. Since 'Freon' came out, we've never used anything else."

St. Louis, Missouri, service man reports: "We've never had a moisture or corrosion problem in equipment charged with 'Freon.' It's absolutely dependable—always pure and dry."

All over the country, users are talking about the advantages of Freon* refrigerants

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"Freon" is today's premium-quality refrigerant . . . stable, pure, dry—nonflammable, nonexplosive, nontoxic. It's time-tested—in use over 27 years and made only by Du Pont—backed by years of technical and manufacturing leadership.

Specify "Freon" refrigerants for every refrigerant need. Your Du Pont wholesaler has it—now capped in gold and factory-sealed to guard its purity till you're ready to use it.

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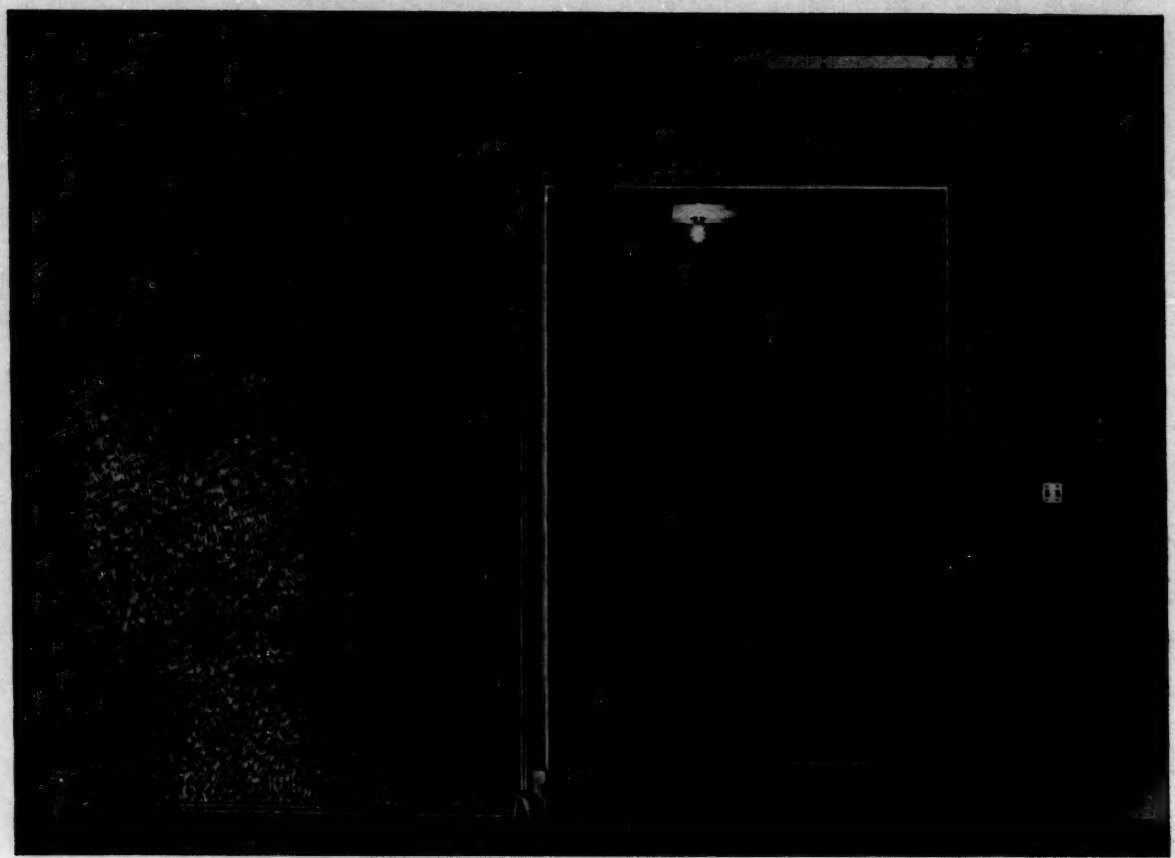
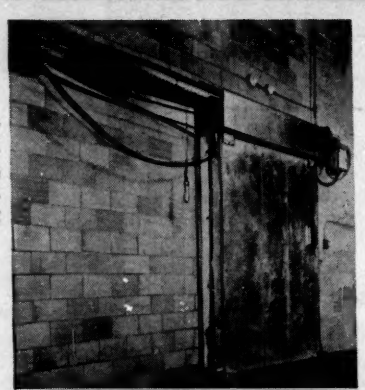
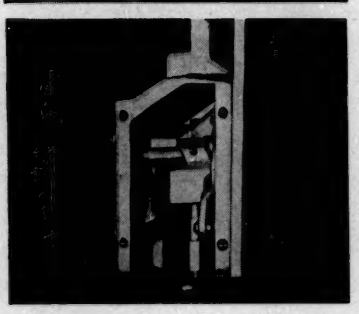




FAST OPERATION of Electroglide Freezer Door saves refrigeration. Note Jamison Frostop® installed to prevent icing and freezing.



POSITIVE SEAL. When door reaches closed position, exclusive Jamison camming action forces door *in* and *down*.

Photos Courtesy: National Tea Company,
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Insulator: Low Temp Insulations, Omaha, Nebraska

In-and-out freezer room traffic speeded up by Jamison Electroglide® Doors

The efficiency and economy of Jamison's new Electroglide Power Operated Door are assured by special Electroglide features—available in no other door.

RANGE OF TYPES—Available as bi-parting and single leaf right or left hand.

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JAMISON

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